Scientific American.

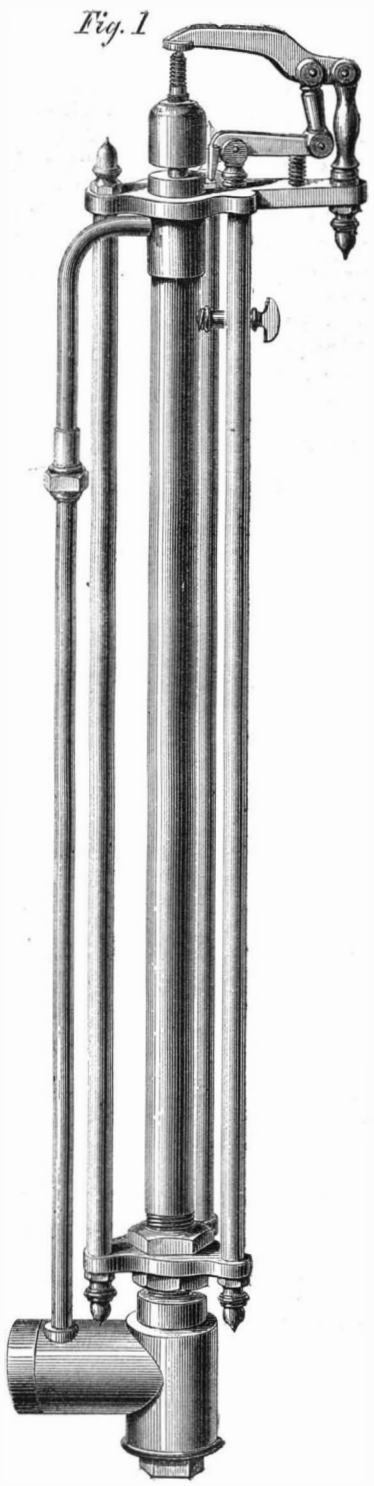
A WEEKLY JOURNAL OF PRACTICAL INFORMATION IN ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES.

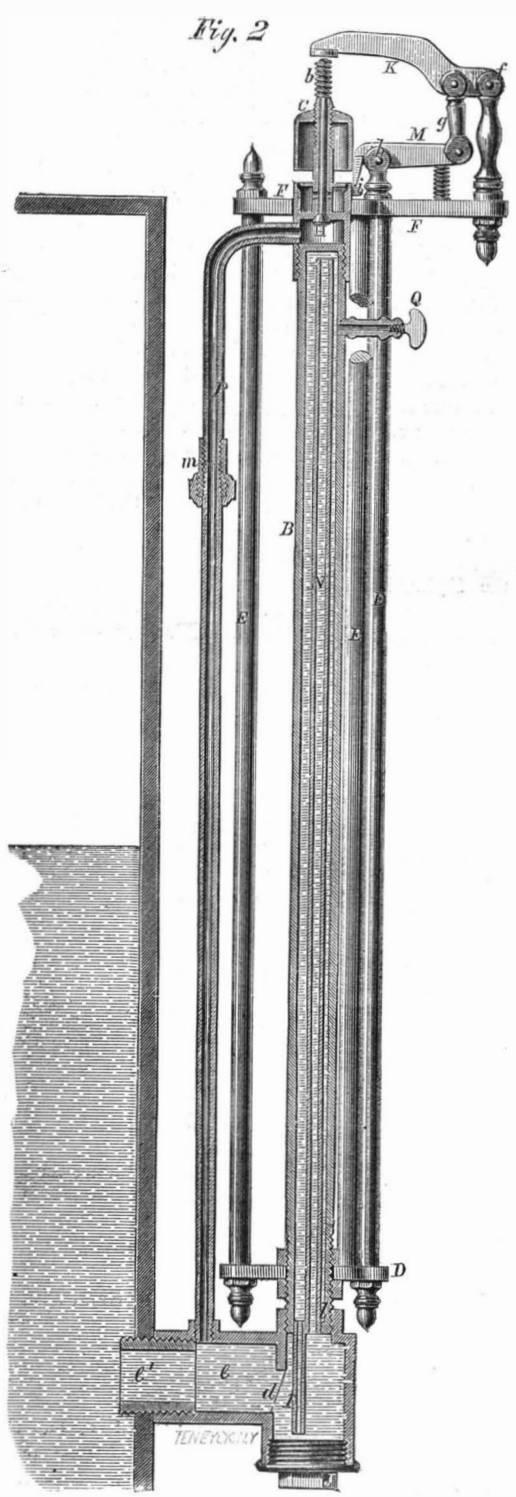
VOL. VI.---NO. 8.] NEW YORK, FEBRUARY 22, 1862. NEW SERIES.

A Low Water Detector.

It is well known that more boiler explosions occur in consequence of the water getting too low in the boiler than from any other cause; perhaps more than from all other causes combined. Many plans have been devised for giving notice to the engineer when the water is getting too low, and among them is the plan of the expanding tube. This consists in connecting a long tube with the boiler in such manner that the tube may be filled with water when the water in the boiler is at its proper level, but when the water falls steam will enter the tube, and by its greater heat will cause the tube to expand. Suitable mechanism is arranged so that the expansion of the tube will admit steam to the whistle, and thus sound the alarm. The accompanying engravings represent some modifications in his plan, and they are excellent illustrations of this class of low water detectors.

Fig. 1 is a perspective view of the apparatus, and Fig. 2 is a vertical section. B is the expanding tube, communicating at its lower end with the water in the boiler, through the pipe, *e'*, which is inserted in the head of the boiler at the level at which it is desired, to sound the alarm. The tube, B, has in its axis a smaller tube, N, open at both ends, and a tube, I, also open at both ends, is inserted in the lower end of tube, B; the tubes thus forming a syphon. When the steam begins to form in the boiler, the first time after the detector is applied, the stop cock, Q, is opened to permit the escape of air, and the pressure of steam forces the water into the tube, B, filling it, when the stop cock, Q, is closed. As long as the water in the boiler remains above the level of the pipe, *e'*, the tube, B, will continue full of water, and as it is at a little distance from the boiler it will be comparatively cool. But if the water in the boiler falls to the level of the opening, *d*, from the pipe, *e'*, to the tube, the water will flow down by gravity into the boiler, and steam will flow into the tube, causing it to expand by the increase in temperature.





BLAKE'S LOW WATER DETECTOR.

The mode in which this expansion is made to sound the whistle is as follows: A steam pipe, P, leads from the chamber, *e*, to the steam whistle, C, the passage to the whistle being closed by the puppet valve, H, which is held up in place by a spiral spring, *b*. A lever, K, having its fulcrum at *f*, is connected by a link, *g*, with a second lever, M, which has its fulcrum at *h*, and the end of its short arm resting over a projection on the tube, B. It will be seen that the levers, being actuated near their fulcra, a small motion of the projection on the tube, B, will cause a large motion of the end of lever, K, which will press down the valve, H, and admit steam to the whistle, C, thus sounding the alarm.

The levers, K and M, are attached to a plate, F, which is connected by rods E E, with the plate, D, at the lower end of the tube.

The plug, J, is provided for cleaning the pipe, whenever it may be necessary.

The pipe, M, has an expansion joint, *m*, so that it may not be injured by the changes of temperature.

The opening into the pipe, P, being a little above the opening, *d*, into the tube, B, the steam will continue to blow the whistle after the water begins to fill the tube, B, and thus the blowing of water through the whistle is prevented.

The arrangement of the tubes so as to form a syphon causes a constant circulation through them, and thus prevents any accumulation of sediment, or any formation of scale upon their surfaces. This important advantage has been proved by eighteen months' practical trial. This arrangement also causes the tubes to be emptied very quickly on the reduction of the level of the water in the boiler; thus making the apparatus exceedingly sensitive and prompt in its action.

This detector was invented by George W. Blake; the patent was granted August 20, 1861, through the Scientific American Patent Agency, and further information may be obtained by addressing Blake & Wheelock, at No. 71 Gold street, New York city.

TREATMENT OF EARACHE.—M. Emile Duval, of Lyons, France, says that he has, in person, found relief in severe earache, after other means had been tried in vain, from the use of a mixture of equal parts of chloroform and laudanum; a little being introduced on a piece of cotton. The first effect produced is a sensation of cold; then there is numbness, followed by a scarcely perceptible pain and refreshing sleep.

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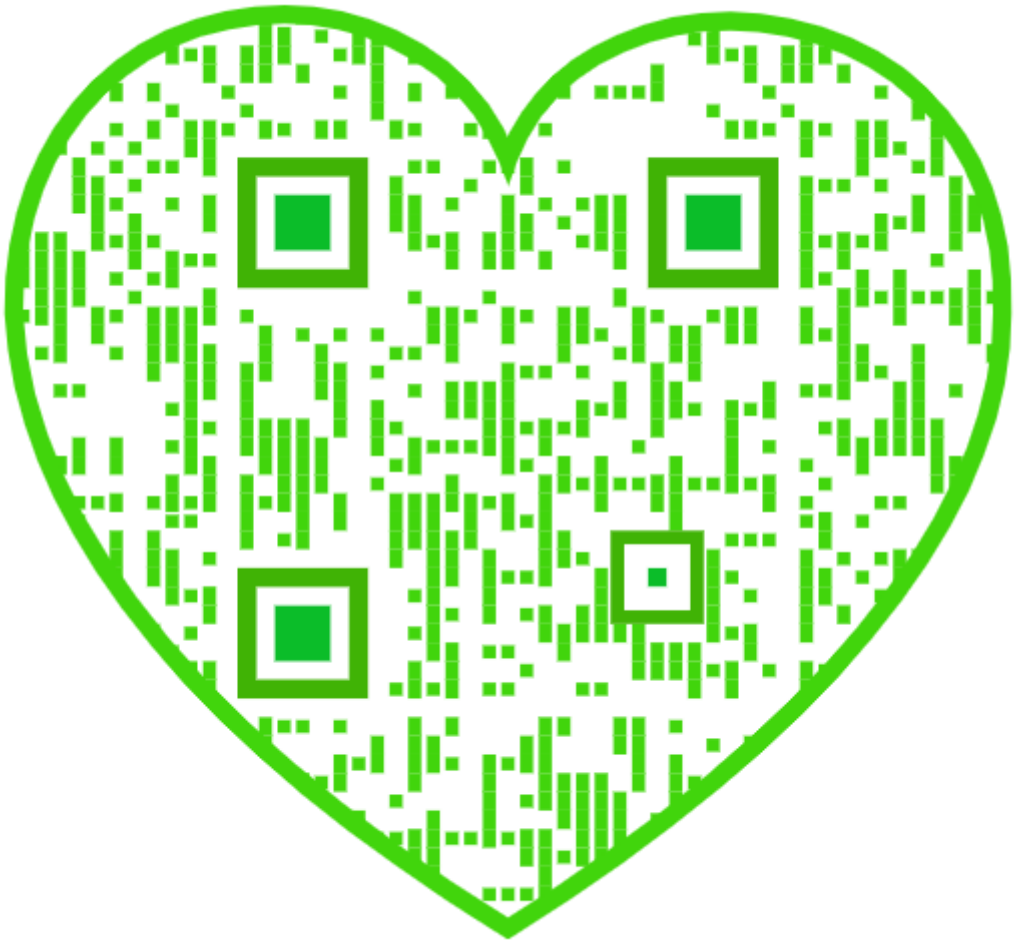

NOTES ON MILITARY AND NAVAL AFFAIRS.

THE SITUATION.

During the past week the country has been electrified with another success. The navy has again achieved an important victory in the bombardment and reduction of Fort Henry on the Tennessee river, which is about 55 miles from Paducah. We publish on another page a carefully-prepared map of the States of Kentucky and Tennessee, which will show our readers all the important points now in dispute. We begin with Paintsville, Eastern Kentucky, which is up the Big Sandy river some 50 miles. This point was recently held by General Humphrey Marshall and his gang of marauders. In a letter just received by us, from a resident of that place, we are informed that Humphrey's men seized about everything they could lay their hands on—in some cases leaving the loyal people destitute of almost every comfort. We have an order now from that place for a few necessary things, which at once suggests the devastating operations of war. Colonel Garfield, at the head of some 4,000 Union troops, drove back Humphrey and his men, and is now encamped at Paintsville. Piketon and Barboursville in Kentucky and Knoxville in Tennessee are all noted places on the Eastern section of the map. A little to the westward are Somerset, Mill Spring and Monticello, all famous places. Still further west are Munfordsville, Bowling Green and Nashville, and farther still are Fort Donaldson, Fort Henry, Paducah, and that all-important point, Columbus, which is no doubt soon to be the theater of a great battle. Our readers will find the map one of the most comprehensive and best executed which has yet appeared, and will prove invaluable for future reference.

CAPTURE OF FORT HENRY.

The attack on Fort Henry began on the 7th inst at 11:30 o'clock in the forenoon. A fleet of gunboats, consisting of the *Essex*, Commodore Porter; the *Carondelet*, Commodore Walker; the *Cincinnati*, Commodore Strembel; the *St. Louis*, Lieut. Paulding; the *Conastoga*, Lieut. Phelps; the *Taylor*, Lieut. Gwinn, and the *Lexington*, Lieut. Shirk, all under the command of Flag-Officer A. H. Foote, opened a terrific fire upon the fort. The gunboats advanced boldly against the fort, receiving and returning the storms of shot and shell, when, getting within 300 yards of the enemy's work, the boats came to a stand and poured into him right and left. At 1 o'clock the enemy struck his flag and surrendered. General Lloyd Tilghman and his staff, with 60 men, were made prisoners. Such cheering, such wild excitement as seized the throats, arms or caps of the four or five hundred sailors of the gunboats can be imagined. The fort mounted 20 guns and 17 mortars. Most of the guns were 32 and 34 pounders, besides one 10-inch Columbiad. One of their rifled 32-pounders burst during the engagement, wounding one of their gunners. The *Essex* was disabled at the commencement of the fight, in consequence of a ball penetrating her boiler. By this accident several gallant marines were scalded, some of them fatally. The loss of life in the action was comparatively small. We have already published a full account of the Western gunboats. They are built very wide, in proportion to their length, giving them almost the same steadiness in action that a stationary land battery would possess. They are constructed on the same principle as the famous iron battery at Charleston, the sides sloping upward and downward from the water line at an angle of 45°. The bow battery on each boat consists of solid oak timber 26 inches in thickness, plated on the exterior surface with iron two and a half inches thick. The boats were built so that in action they could be kept "bow on;" hence the superior strength of the bow battery. Broadsides were so arranged as to be delivered with terrible effect while shifting position. To facilitate movements in action, the engines and machinery are of the most powerful kind. The boilers are five in number, constructed to work in connection with or independent of each other. In case of damage done to any one or more of them, a valve was arranged to close the connection between damaged and undamaged boilers, and the latter operate as if nothing had happened.

It is reported that the amount of plunder secured by the victory at Mill Spring and Fort Henry will exceed one million dollars. An attack on Fort Donaldson on the Cumberland rivers was hourly expected, and it is thought that a severe battle must ensue.

BURNSIDE'S SUCCESS.

One of the most gratifying pieces of news which has cheered all loyal hearts, is the success of General Burnside's expedition. After many vexatious delays and much painful solicitude, he at last got his expedition under way from Hatteras up Pamlico Sound on Wednesday the 5th inst., making toward Roanoke Island, which serves as a guard or key to Albermarle Sound. The island itself is about seven miles long and three broad. On both the island itself, at Nag's Head and on the mainland, strong earth-work fortifications have been thrown up, and, according to intelligence gathered from secession sources, there was besides an entrenched camp in the center of the island, consisting of 5,000 men under Major-General Hill, of North Carolina. Reports also state that the valiant Ex-Gov. Wise, whose extraordinary fighting capacities we have before noticed, was sent down to reënforce the position. Under the leadership of this modern Boanerges, General Burnside, who is every inch a soldier, was promised a very different kind of reception to that which General Butler encountered at the attack on Hatteras. General Burnside's arrival at Hatteras was known at least twenty days before he began the attack, which afforded the enemy ample time to prepare for it.

All the information we have respecting the battle, at the time of going to press, was obtained from the enemy by means of a flag of truce, but it is sufficiently comforting. The information is vague as to the time the attack on Roanoke Island began, but we judge, from the meager details at hand, that it commenced on Friday, and that the island was taken possession of on Sunday, at which time a large force of Union troops were landed.

The secessionists had a small fleet of gunboats, under command of Captain Lynch, who, we understand, conducted the famous Dead Sea Expedition while he was an officer in the United States Navy. One of the vessels of this fleet was the propeller *Fanny*, which was captured by the rebels in Pamlico Sound about the time Hatteras was taken. It is reported that Lynch's fleet was completely destroyed. The exact number of rebel troops on the island is not yet known, but Gen. Huger, commanding at Norfolk, telegraphed to Richmond that only 50 escaped.

The Richmond *Examiner*, of the 10th, in a leading editorial, says, "The loss of an entire army on Roanoke Island is certainly the most painful event of the war. The intelligence of yesterday by telegraph is fully confirmed. Twenty-five hundred brave troops on an island in the sea were exposed to the force of the Burnside fleet. They resisted with the most determined courage, but when 15,000 Federal troops were landed against them, retreat being cut off by the surrounding element, they were forced to surrender. This is a repetition of the Hatteras affair on a large scale."

Some 700 prisoners were taken at Hatteras, and if this is on a much larger scale we can safely put down the captured forces at over 3,000. The reports about the loss in killed and wounded are vague, but the Confederates acknowledge about 300 killed and 1,000 wounded, among the latter is Capt. O. Jennings Wise, of Richmond, a son of the ex-Governor. Gen. Wise it seems was ill at Nag's Head, and when the situation became dangerous he was placed in an ambulance and removed toward Norfolk. This was very unfortunate, as he could have no hand whatever in the fight, and thus escaped being made a prisoner. The Norfolk *Day Book* states that Gen. Burnside advanced in full force upon Elizabeth City, and began an attack on that place. The citizens finding resistance vain evacuated the place, but before doing so set fire to the town. Additional particulars of this important engagement will be looked for with deep interest.

MISCELLANEOUS.

The government, it is stated, has issued an order prohibiting the exportation of quinine and opium to Cuba for the future. It seems that immense quantities have been recently sent from New York to Havana, the real destination of which is the Southern States. Quinine is an article of considerable manufacture in Philadelphia.

Kentucky has a voting population of but 156,000 in all. The portion of the State in possession of the the Union troops contains 100,000 of that total number of voters, and of that population she has full 30,000 enlisted under the banner of the Union for the war! Who will dare say that Kentucky is not loyal to the Union?

A letter from James Guthrie, the Secretary of the Treasury under General Pierce's Administration, generally sustains the financial view taken by Secretary Chase. It also approves of General McClellan's defensive position upon the Potomac; but he thinks that offensive operations by the Union columns are the best plans for driving the rebels out of Kentucky. General Buell is made the subject of his highest commendation.

The Southern papers say the blockade is utterly defective, and yet find it so hard to get flannel that they have to call on the women to contribute their old skirts for use in making fixed ammunition. Why not import flannels, if the blockade is so loose?

The steamship *Bavaria* recently brought to this port four thousand sabers and over forty-five thousnnd stand of firearms, besides equipments of various descriptions and samples of arms, which enterprising manufacturers are sending here for sale.

Hon. Horace Maynard, of Tennessee, has received a letter from his son, who is the Adjutant of the First Regiment of loyal Tennessee Volunteers, in which he writes that "the citizens on the other side of the Cumberland river stated that the sesesh Tennesseans threw down their arms;" to which it is added that 1,500 stand of arms were, it is understood, found in the line of retreat, "stacked up," with many more scattered around.

Gold and Silver Inks.

To prepare gold ink, take honey and gold leaf equal parts; grind together upon a painter's porphyry slab with a muller, until the gold is reduced to the finest possible state of division, and the mass becomes perfectly homogeneous, when it must be agitated with 20 or 30 times its weight of hot water, and then allowed to settle and the water poured off; this process must be repeated with fresh water 2 or 3 times, when the gold must be dried and then mixed up with a little weak gum water for use. The brilliancy of writing performed with this ink is considerable, and may be increased by burnishing. Gold ink may also be made by mixing precipitated gold powder with a little gum water. Silver ink is prepared in the same manner as the gold. By dissolving gold in aqua regia and then adding ether, a solution is obtained which, when applied to polished iron, will coat it with a thin pellicle of cold.

Great Wrought-iron Shot—The Ericsson Battery.

The Ericsson iron-plated floating battery at Green Point has been armed with two 11-inch Columbiads, which have been furnished with 400 wrought-iron round shot, each ball costing $47 and weighing 184 lbs. These balls were made by forging square blocks of iron at the Novelty Works, then turning them in the lathe. The cost of the 400 amounts to $18,800, and their total weight is 73,600 lbs. Cast-iron shot are liable to break in pieces when fired against thick iron plates. These wrought-iron shot are for smashing through the sides of such secession floating batteries as the *Merrimac*, at Norfolk; and *Hollin's Turtle* at New Orleans.

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A NEW ASTEROID.—Dr. C. H. F. Peters, Director of the Hamilton College Observatory, in searching for the Asteroid Maia, has discovered a new one, which is probably nearer the earth than any other before known. The known Asteroids now number 72.

MR. BROADWOOD, a celebrated manufacturer of pianofortes in London, died recently, leaving a fortune of $1,600,000, all made by his business.

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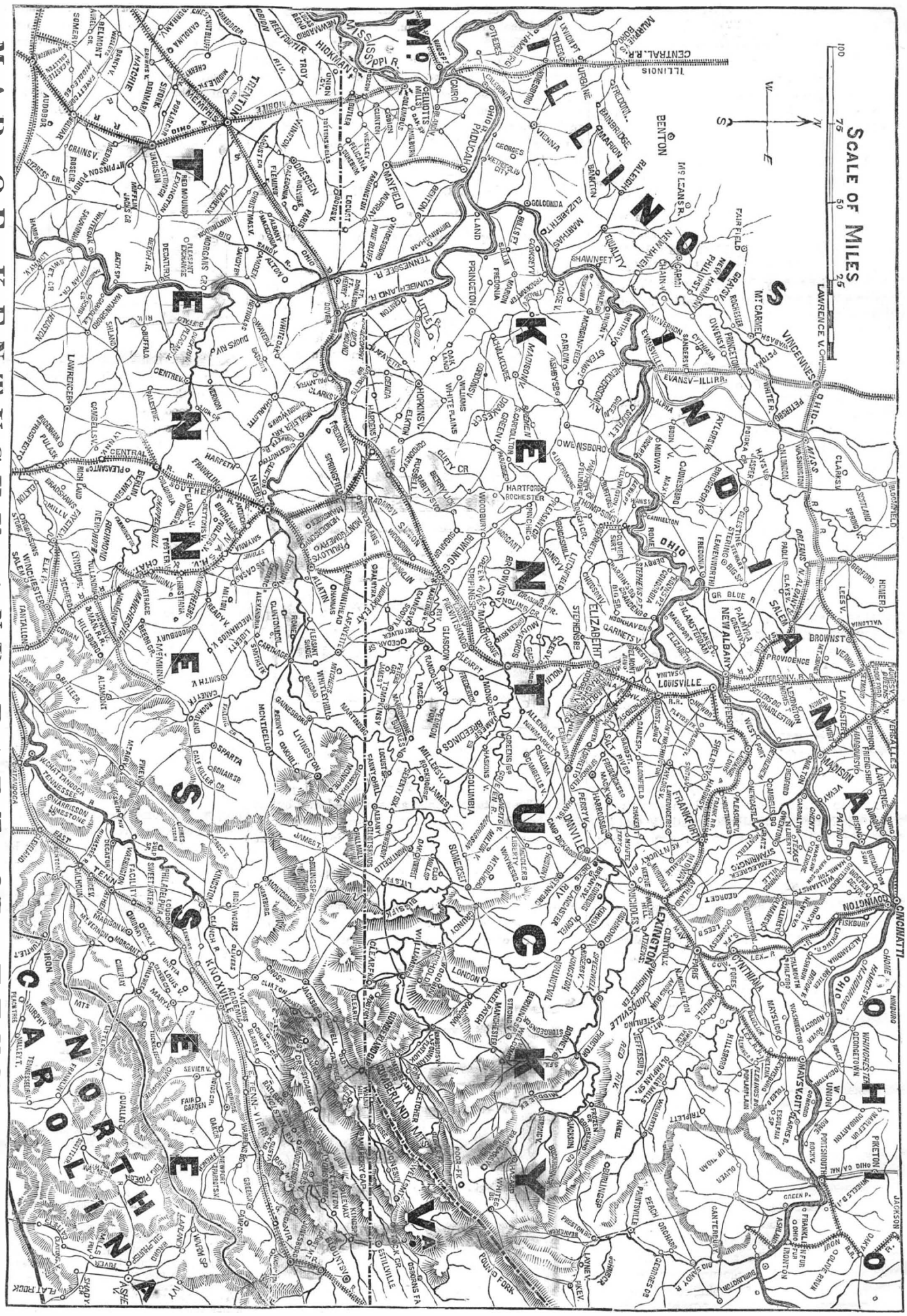
MAP OF KENTUCKY AND PART OF TENNESSEE



The rebellion against the rightful authority of the country has had the effect to stimulate increased interest in the geography of the United States and its vast contiguous territories. We always knew that we had an immense country, but since the outbreak of the war its magnitude has seemed to considerably increase. The map which we publish this week of two great States, is, in reality, not much more than a patch on the surface. Kentucky is a loyal State, Eastern and Middle Tennessee are equally so, and but for the presence of an army of secessionists, ready to suppress every loyal demonstration, we should see that noble State redeemed and reunited. We think the government is now ready to show its full power against the rebellion, and a few months, at least, will, it seems to us, settle the fate of the Republic. Jeff. Davis's armies must be defeated before loyalty will dare to show its front.

Many Europeans have expressed wonder and surprise that twenty millions of people should be so long in overcoming half that number. They either ignore or are ignorant of the fact that at the outset the government, through the treachery of Cobb, Floyd and Thompson, was nearly bankrupt and disarmed.

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THE CHEMISTRY OF COAL.

Number IV.

MECHANICAL MIXTURE AND CHEMICAL COMBINATION.

Coal tar is composed of a large number of substances, principally hydrocarbons, which are mechanically mixed together. And before going further let us get distinct ideas of the difference between mechanical mixture and chemical combination.

If one quart of oxygen is mixed with two quarts of hydrogen, the two gases mingle together but each retains its own properties. The hydrogen is light and combustible; the oxygen will not burn, but is the most efficient supporter of combustion and of respiration; and both are permanent gases which cannot be reduced to either the liquid or the solid state. Their atoms are held apart like the atoms of all gases, and their positions may be represented thus, the large Os standing for the atoms of hydrogen and the small os for the atoms of oxygen :—

O o O o O O o
o O o O o O o
O o O o O o O
o O o O o O o

This is a mechanical mixture. But if the mixture is heated to the temperature of flame, each atom of oxygen is instantly joined by the mysterious force of chemical affinity to an atom of hydrogen, the two forming an atom of water. Then their positions will be represented thus :—

Oo Oo Oo Oo Oo Oo Oo
Oo Oo Oo Oo Oo Oo
Oo Oo Oo Oo Oo Oo Oo
Oo Oo Oo Oo Oo Oo

They are now united in chemical combination; and their properties have undergone a most wonderful change. The compound is entirely unlike either of its elements. It is no longer a permanent gas, but becomes liquid at 212° Fah., and solid at 32°. It is not combustible, neither will it support combustion or respiration.

A portion of the hydrogen and carbon in coal tar is combined to form the substance known as benzole, in which 12 atoms of carbon combine with 6 atoms of hydrogen to form one atom of benzole, C_{12} H_6. Another portion forms tolual, in which 14 atoms of carbon combine with 8 atoms of hydrogen, C_{14} H_8. Other portions combine in other ways to form other substances, and then these several substances are mingled together mechanically to constitute coal tar. Next week we will examine some of the most interesting of these substances.

Uses of Camphor.

SPIRITS OF CAMPHOR.—The gum resin camphor readily dissolves in alcohol, forming spirits of camphor. About two ounces of the camphor is generally dissolved in about a pint of the spirits. It is used as an external application for sprains, local pains and stitches. It is applied by rubbing with the hand upon the painful part. To secure the full benefit of the application, the part should be afterward covered with a piece of flannel of suitable size, more or less wetted with the spirits, and the whole covered with oil silk for the purpose of restraining evaporation.

CAMPHORATED OIL.—This is another camphor liniment. The proportions are the same as in the preceding formula, substituting olive oil, for the alcohol, and exposing the materials to a moderate heat. As an external stimulant application it is even more powerful than the spirits, and to obtain its full influence, the part treated should be also covered with flannel and oil silk. It forms a valuable liniment in chronic rheumatism, and other painful affections, and is specially valuable as a counter irritant in sore or inflamed throats, and diseased bowels. Champhor constitutes the bases of a large number of valuable liniments. Thus in cases of hooping cough and some chronic bronchitic affections the following liniment may be advantageously rubbed into the chest and along the spine. Spirits of camphor two parts; laudanum half a part; spirits of turpentine one part; castile soap in powder a finely divided half an ounce; alcohol three parts. Digest the whole together for three days and strain through linen. This liniment should be gently warmed before using. A powerful liniment for old rheumatic pains, especially when affecting the loins, is the following :—Camphorated oil and spirits of turpentine, of each, two parts; water of hartshorn one part; laudanum one part; to be well shaken together. Another very efficient liniment or embrocation, serviceable in chronic painful affections, may be conveniently and easily made as follows: Take of camphor one ounce; cayenne pepper in powder two teaspoonsful; alcohol a pint. The whole to be digested with moderate heat for ten days and filtered. It is an active rubifacient; and after a very slight friction with it it produces a grateful thrilling sensation of heat in the pained part, which is rapidly relieved.

SURFACE CONDENSERS FOR STEAM ENGINES.

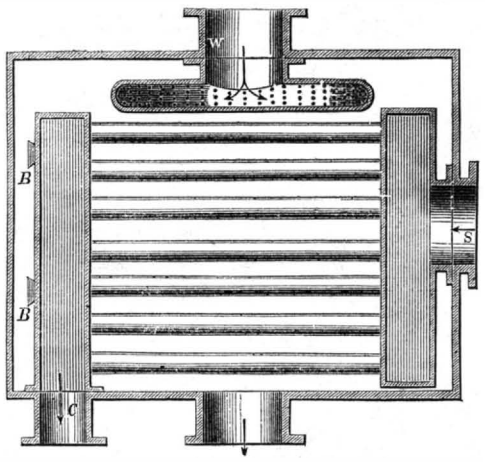
Number VII.

In continuing the papers on this useful subject Mr. Louth says :—

In the condensers hitherto described the condensation is effected by the circulation of a body of water, but other plans have been proposed, and, to some extent, used, in which the process is effected by the evaporation of the condensing water which is sprinkled upon instead of surrounding the tubes in a solid body. On this plan several have been made by Mr. Pirrson, of New York, as represented by Fig. 18.

Fig. 18.

PIRSSON

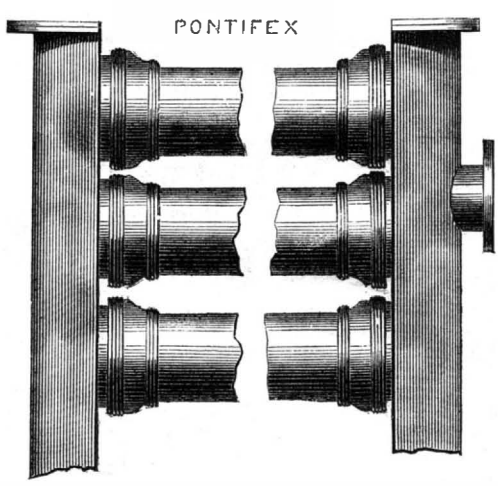


The tubes through which the steam passes are fixed into these copper tube plates, and water allowed to fall or trickle over them from a perforated pipe or rose. The waste water and air are withdrawn by the lower branch, W. In these condensers a communication is made between the exterior and interior of the tubes by means of the orifices, B.

By this contrivance the pressure is equalized and all strain on the tubes and plates removed, but the arrangement involves the loss of upwards of 25 per cent of the condensation water. I am also informed that these condensers, at least in some cases, wear out quickly, those placed on board *The State of Georgia*, an American vessel, having been renewed three times in six years. Whether this is owing to evaporating the water on the surface of the tubes, or what other cause, I am not informed. This system has the following advantage, that should the condenser get out of order by removing the tubes, it is converted into an injection condenser.

Fig. 19.

PONTIFEX

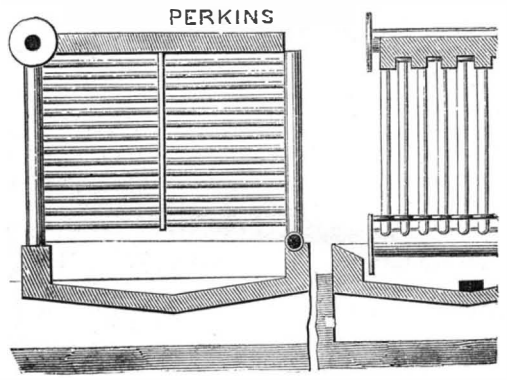


Condensers of this class have the advantage of being lighter than those which I have before described, owing to their not having so great a body of water in them.

Messrs. Pontifex make condensers, as shown in Fig. 19. Copper tubes of large diameter are fixed at each end into a cast-iron box, allowance being made at one end for expansion by a collar of india-rubber attached to the tube, and also to the socket, as shown. The condensing water is made to fall on them in the form of a shower, and is rapidly evaporated by the steam within, which is thus condensed. Many of these condensers are in use in London producing good results, but they are only adapted for land engines and to be fixed to the exterior of the enginehouse. I am also informed that they are subject to rapid corrosion.

Fig. 20.

PERKINS



Mr. Perkins has a very successful condenser, represented in Fig. 20. It is composed of a number of horizontal iron tubes of small diameter, screwed into vertical tubes of 3 inches diameter, ⅜ inches thick connected with the exhaust steam pipe on the one side, and the condensation water pipe on the other. The small horizontal pipes are, after being screwed into the 3-inch pipes, caulked up, thus making a secure joint, and, from their length and small diameter, bend when unequal expansion takes place. The steam passes through the tubes, the condensing water falling on the exterior surface. This condenser produces good results. On one which I had an opportunity of seeing at work, and which had been successfully used for some time, I observed a small deposit of scale which was, however, at that time not sufficiently thick to cause any practical inconvenience.

I also observed that on one set of tubes which had, by way of experiment, been galvanized, the scale was not nearly so thick as on the others. Mr. Perkins proposes, in some instances, to inclose this condenser in a case, and from thence form a communication with the furnace or chimney of the boiler, which, by the rapid current of air passing through, would, no doubt, increase its efficiency.

Dangerous Character of Benzine.

The following is from the Philadelphia *Insurance Journal*:—

A recent review of fires in this city since the 24th of October, by the Fire Marshal, Mr. A. W. Blackburn, refers to benzine in connexion with two or three disastrous fires originating through its use. The Fire Marshal has been convinced that haversacks and knapsacks, made of duck or muslin, or any kind of linen or cotton fabric, when coated with paint, composed of lampblack and linseed oil, hastily and carelessly mixed, and then glazed with varnish, in which benzine is an ingredient, when packed tightly in boxes for transportation, or closely piled in heaps in manufactories, are constantly liable to take fire from spontaneous combustion. Benzine is a component part of petroleum or coal oil in its crude state, as it comes from the earth. In refining coal oil for burning or lighting purposes, the benzine, which is highly explosive, is got rid of by the process of distillation. From being, as it was first considered, a refuse substance, it is now fast becoming an important article of trade. In various manufacturing and mechanical arts, it has been found an admirable substitute for turpentine, and owing to the scarcity and high price of the latter article, since the blockade of the North Carolina ports, benzine from its comparative cheapness—and, indeed, from the almost absolute necessity of the case—is fast taking its place. It makes a handsome and durable paint, and on wood and other solid surfaces, is harmless; but as an in ingredient in the coating on vegetable textile material, it is at all times, more or less dangerous. It is very volatile, and at a certain temperature rapidly assumes a gaseous form. Where articles, such as knapsacks, haversacks, &c., freshly glazed with varnish made with it, are undergoing the process of drying, especially by the heat of boilers or steam pipes, the whole surrounding atmosphere becomes filled with benzine gas, and let combustion ensue from any cause whatever, at such a time, the apartement will be enveloped in flames, with the rapidity of lightning. These facts ar well worth the attentive considerat on of Underwriters.

The benzine so termed is the light spirituous oil which passes over first at a low heat in distilling petroleum, not coal oil.

The total import of cotton from Europe from the 1st to the 8th of February was 3,510 bales.

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THE PLAN OF CREATION.

A LECTURE BY PROFESSOR AGASSIZ.

[Reported for the Scientific American.]

After a few preliminary remarks the lecturer said. The animal life of our globe shows that it has been formed with the design of bringing forth man as its last and highest creation. The history of the earth during those inconceivable periods of time before the human race was created has been traced by the united labors of astronomers and geologists.

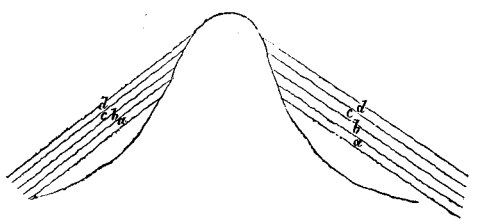
By the theory of Laplace, which is now generally accepted, it is supposed that the solar system once existed as a nebula, a vast distended flat mass of fiery particles of matter, revolving upon its axis. As it cooled it contracted, and threw off rings upon its outer edge, like the rings of Saturn. These were then drawn together into globes of molten matter

Between the time at which the astronomical history ends and that at which the geological begins, there is a period which has not been examined, because there is no man competent to undertake the investigation. As frequently happens in science, we must wait for another generation to be educated for this work; for, learning the art of investigation is the labor of a life-time.

Geology finds the earth in a state of igneous fusion. In examining the rocks of the earth we find that they consist of two classes. Those of one class are formed in layers like the leaves of a book, while those of the other class are simple masses without stratification.

The stratified rocks were formed by being deposited at the bottoms of seas and lakes. Let me present some of the evidence by which this fact is known. All except the very oldest of the stratified rocks are filled with animal remains—especially with shells. Now we find these shells always lying upon their broad surfaces. If a shell falls through water and rests upon the bottom, it will not rest upon its edge, but upon its side; and the fact that the shells contained in the rocks always have their broad surfaces parallel with the planes of stratification is one of the proofs that these rocks were deposited in water. Many of these rocks now lie in a slanting position upon the slopes of mountains, but as we find the shells which they contain with their broad surfaces parallel with the planes of stratification we have no doubt that these rocks were formed and hardened in a horizontal position.

The stratified beds have been raised into a slanting position by the rocks from below being pushed up through them. This diagram may represent a mountain. The



central mass is of unstratified rock, with the stratified rocks lying upon its sloping sides in this manner. We know that these rocks have been raised in this manner, not merely from the broad surface of the shells being parallel with the planes of stratification, but also from the fact that we find the same kinds of rock lying one upon another in the same order on both sides of the mountain. The rock, *a*, upon this side corresponds with the rock, *a*, upon that side, the rock, *b*, on this side, with the rock, *b*, on that side, and so on.

When the unstratified rocks were forced up among the rocks lying above them, they were in a state of igneous fusion. This is shown in the fact that they have run into and filled the crevices and cavities in the stratified rocks, which they certainly could not have done if they had been in a solid state. The fact is farther proved by the alteration which they have made in the portions of the rock with which they came in contact. We know that if marble is put into the fire it will be reduced to quick lime; and that if sandstone is highly heated it is formed into coarse glass. The effects of heat upon rocks of various kinds is well known, and we find these effects wherever the mass from below has broken through the stratified rocks. There can be no doubt that that mass was in a state of igneous fusion.

All over the world the highest mountains have been raised up since the lower ones. The oldest mountains on this continent are the Capotian, extending in an easterly and weserly direction north of the great lakes. The Appalachian chain is older than that of the Rocky mountains. So in Europe, the Alps are newer than those of less elevation. This is what we should have expected if we had reasoned on a sound basis. When the hard crust of the earth was comparatively thin, it would yield to a slight force of upheaval, but as it became thicker from the gradual cooling of the globe, it would require a greater force to break it up, and, consequently, the forces accumulated and produced proportionably greater effects.

When we find one rock which has unquestionably been deposited upon another rock, it is manifest that the one lying below was formed first; and thus we are furnished with sure evidence of the relative ages of the rocks. The successive layers of rock are like the pages of a book, arranged one after another in regular order.

Now let us take a general view of the history of animal life, as preserved in this record. The rocks of the earth are naturally divided into several classes, resting one upon another in the order represented on this table:—

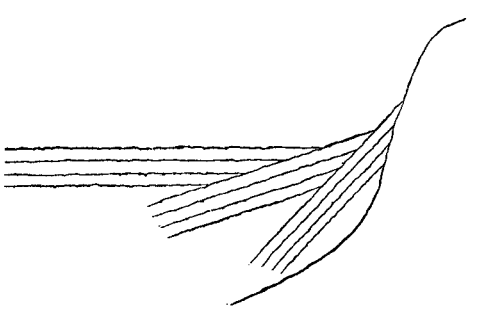
	Radiates.	Moluscs.	Articulates.	Vertebrates.		
Recent						Mammals.
Pleocine					Birds.	
Meocine						
Eocine						
Cretaceous				Reptiles.		
Jurassic						
Permian						
Carboniferous						
Devonian						
Silurian				Fishes.		
Unstratified						

At the bottom we have the unstratified rocks—granite, scienite, trap, &c., and above these the stratified rocks named generally from the localities in which they come to the surface.

The lowest of the stratified rocks contain no animal remains, and are therefore called azoic. But in the silurian we find all four orders of animals; the radiates, of which the starfish and the coral are samples; the moluscs, to which the oyster and clam belong; the articulates, embracing the lobster and all insects; and even the vertebrates are represented in certain low forms of fishes. This commencement of the creation of animal life upon these four modes of structure shows the formation of a determined plan from the beginning—a plan that embraced the creation of man as its final culmination.

The three lower orders are represented by all the classes which now exist, but at the beginning there was only one class of vertebrates, the fishes, after a a long time the reptiles were created, then birds, and finally mammals, to which class man belongs. The lower orders are not represented in the older rocks by the same species which now exist, but even in these there has been some degree of improvement—a general tendency to a higher and more complex structure.

The several species have not been gradually developed one out of another, but in each case a new creation has succeeded to the old. This diagram repre-



sents the manner in which the different rocks rest one upon another on the sides of mountains. The rocks nearest the the mountain being the most inclined in this way, then other rocks lapping over them and less inclined, till we come to the upper rocks, which are generally horizontal or nearly so. As the shells in these rocks and other evidences prove that they were all deposited in a horizontal position, it is evident that they have been inclined one after another by successive upheavals of the mountain. The injection of a vast mass of matter in a state of igneous fusion must have destroyed all animal life in the adjacent waters, rendering a new creation necessary. The persistent following of the same plans through all of these successive creations shows the existence of a preconceived design. In my next lecture, I will examine the progress of animal creation more in detail, this lecture being intended as a general introduction to the subject.

Science a Civilizer.

Dr. J. Buller at a recent meeting of the Southampton Microscopical Society, said:—The social aspect of our society commends it. It is a pleasant way of spending an evening where there is a scientific object of natural interest, and, at the same time, a social gathering of many having the same tastes and objects, and, therefore, the same sympathies. The anatomy of an insect, too, is a more harmless occupation than the minute dissection of a neighbor's natural history. Tea and coffee, pleasant chat with those of like tastes, and then the table covered with microscopes and specimens explained by one and passed round for each to examine, calling out animated talk on subjects worth discussing, or a short paper read and discussed on the subject illustrated, are civilizing. For science is a civilizer. It refines the tastes and elevates the thoughts, as it is the search after truth for truth's own sake. And in this age, when the progress of the nation and of the world is estimated by the money-value of exports and imports (and in this aspect the world's progress is prodigious and annually increasing), the danger must lie in estimating all things in reference to money rather than to truth. Now, science is a counteracting force. It neither brings wealth to its true cultivators, nor can wealth buy scientific tastes or scientific fame. It belongs to a higher region than "the diggings." It must breathe "a purer ether, a diviner air." And those who are engrossed in commerce would often do well, for their own content and happiness, by seeking in the recreations of science a complete change of action, thought, and feeling. Obviously the eye service which the microscope requires, trains the eye to minute and discriminative observation, and the hand to delicate accuracy. It leads on, if used scientifically, to the improvement of the scientific powers. The memory, the investigation of causes, the estimation of evidence, the power of distinguishing and of generalizing may be called into activity. But the mind has other and deeper needs than these. The senses lead to the awakening and culture of deeper powers inherent in the soul itself, and the microscope may excite and cultivate, not only the sense of the true, but of the beautiful. Constable, the landscape-painter, said that, pictorially, nothing in nature was ugly; and surely we may say the same microscopically. The higher the magnifying powers, the more minutely extensive the investigations, the more beauty do we see. Even in the unhealty secretions—in what look to the unscientific eye like repulsive fluids, in the very disorganizations which slowly ruin this goodly human frame, the microscope discovers forms of the highest geometrical accuracy, as well as of the most delicate beauty. And this beauty and consummate finish are everywhere, and are found farther and deeper as our powers increase of observing them. Here, too, at every step we find the limitation of our own powers, and the illimitable field of nature; the infinite contrasting with the finite teaching us the moral lesson of science—humility.

PAINTING WITH ANILINE COLORS.—Professor Seely, in the last number of the *American Journal of Photography*, says—"The aniline colors may be used for painting albumen photographs. These colors are all soluble in alcohol and being thickened with the proper spirit varnish are especially suitable for painting transparencies on glass for the magic lantern and other purposes. There are no colors more dazzlingly bright than the aniline dyes, and they are as permanent as any others of a similar tint."

THE *Lake Superior Miner* states that $100,000 of silver is obtained annually from the copper mines.

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Correspondence

Gravity and the Pendulum.

Messrs Editors :—Seeing that in your last paper you touched upon the subject of gravity and the pendulum I desire to get you to take the trouble to read a short article on that subject in the inclosed periodical, *New Hampshire Journal of Education.* I desire you particularly to notice the idea illustrated in the diagram, and say whether something beside variableness of force of gravity has to do with the variations in the beat of pendulums in different latitudes or not ?

J. C. B.

The use of the pendulum in investigating the figure of the earth results from its power of measuring the intensity of the force of gravity in any given place.—*Olmstead's Philosophy, Vol. II., Art.* 366.

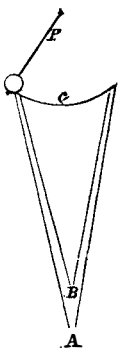
When I was a teacher some years ago I felt disposed to question the received theory of the variableness of gravity from the equator to the poles. Not knowing but the same theory is in vogue still, I am inclined to submit a few reasons why I think that a "pound is a pound the world around."

That the force of gravity is the same the world over at the surface of the ocean, might be inferred from the fact that the earth is to so great an extent covered with water, as to show that its form is just such as it would take if entirely fluid. That its form, if in a state of rest, would be globular, is admitted by all. And that in this case the force of gravity would be alike all over the surface is also admitted. Now let the diurnal motion commence. The centrifugal force neutralizes somewhat the force of gravity at the equator. The equilibrium must be restored and to do it the poles come in toward the center and the equator goes out from it. Here it is seen that the earth changes its form from a globe to a spheroid for the purpose of equalizing gravity after it has been disturbed by another force. Then after doing so much toward equalizing it, why does it not do it entirely ? Nature is not in the habit of leaving things half done. Then why in this case has she flattened the poles and bulged out the equator of the earth in order to make gravity the same the world over, and yet left it in such a forced construction that a pound is heavier at the poles than at the equator ? Can any body tell ?

Here let it be observed by all persons who have heretofore had an impression to the contrary, that the flattening of the poles and bringing them nearer the center tends to diminish the force of gravity there. The idea that the force of gravity at the poles must be greater because they are nearer the center, is entirely erroneous. The absurdity of the idea is seen at once by supposing the process of flattening continued till the earth becomes a thin disk ; in which case it is evident that the force of gravity would be next to nothing at the poles and very considerable at the edge or equator.

The properties of the water level would seem to settle this question. The water level is a delicate balance. The water stands at the same hight in the two ends only in case the force of gravity is alike at both. The least weight added to one end raises the water in the other till the equilibrium is restored. In the case in hand the ocean is a great and perfect water level, extending from the equator to the poles, and if it were pressed down by force of gravity at the poles more than at the equator then it would most certainly rise at the equator until the weight there should equal that at the poles. It has risen at the equator, as I understand, some thirteen miles higher than at the poles, and if this rise is not enough to equalize gravity, why does it not rise higher? Is there anything to hinder ? I can see nothing, and my conclusion is that the notion that there is any difference in the force of gravity at the equator and the poles is altogether a mistake. I have no idea that if the most delicate spring scales possible should be constructed, and the same weight put upon them in different latitudes any difference in the force of gravity would be detected.

But the pendulum beats quicker in high latitudes. This is true, and the fact may possibly be accounted for without recourse to the theory of the variableness of the gravity at the level of the ocean. The angle at which gravity acts upon the pendulum may have something to do with it. Gravity acts in straight lines toward the earth's center, and in case of a pendulum at the poles, the arc through which it beats would measure a greater angle at the center than the same would at the equator, for the reason that at the poles it is nearer the center.



By the diagram : Let P represent a pendulum, *c* its arc of vibration, A the center of the earth when the pendulum is at the equator, and B the center when the pendulum is at the poles. It is evident at sight that the same force of gravity acting from B would move the pendulum faster than if acting from A, because it acts more nearly in the direction in which the pendulum is to move. Here is a sufficient reason for the quicker vibration of the pendulum at the poles than at the equator, without the supposition of increased gravity.

On mountains decreased gravity and increased distance from the center would both operate to retard the motion of the pendulum.

I should, therefore, propose to amend the theory as stated by Mr. Olmstead, and make it read as follows :—

The use of the pendulum in investigating the figure of the earth, results from the fact that the force of gravity acts upon it at a greater or less angle, with the vertical line from its point of suspension, as its distance is greater or less from the center.

J. C. B.

Concord, N. H., Feb. 1, 1862.

The Age of a Stalagmite.

Messrs. Editors :—Through no other cause than the pressure of the times upon my purse and the pressure of the war spirit for enlisting I have been without your paper for a few weeks, but I can stand it no longer, and, therefore, inclose you $2 in bullion, for which please send me the Scientific American one year from the 1st of January, 1862.

Some years since, in visiting a cave, I noticed a stalagmite of carbonate of lime of a paraboidal form, about two feet in diameter at the base and about four feet in hight ; and I have recently had the curiosity to make an estimate of the time required for its growth. For data I take the solubility of carbonate of lime, at the ordinary pressure of the atmosphere t one part in 7,000 of water—a drop of water equal in weight to one grain—and suppose one drop to fall every ten seconds and to entirely evaporate before the next one fell.

Find the solid contents in inches, multiply by 252.458, weight of cubic inch of water, then by $2\frac{1}{2}$, specific gravity of carbonate of lime, then by 7,000, number of grains of water to dissolve one of lime, divide by one-tenth of the number of seconds in a year and we have the answer, 15,161 years. Student.

Pocahontas, Ill., Jan. 26, 1862.

Curious Question about Maple Sap.

Messrs. Editors :—Now, when our Northern sugar season is at hand, it seems a suitable time to inquire of your many observing readers for some explanation of the effect of winds upon the flow of sap in the sugar maple. It is well known, at least in New England and this State, that during a south wind this flow of sap is much impeded and generally entirely suspended. A west wind seems to have no effect upon the sap in any way, while northwestern and north winds increase the flow of it. These facts are among the wonderful exhibitions of the subtile influences which often prevail in nature. Here we find the circulation of sap, which is the blood of vegetation, suspended in the solid and hardy rock maple by a southern breeze, while, at the same time, the circulation of the most delicate animal organism, the scarcely breathing infant, courses rapidly on, uninfluenced by the conditions to which the tree yields. I have a theory which I think may lead to an explanation of these phenomena, but prefer to withhold it for the present, in the hope that others may furnish your columns with an entirely satisfactory one. If no one does so, I will give mine ere long. The truth is more likely to be discovered when many minds are brought to bear upon the subject under investigation.

Ransom Cook.

Saratoga Springs, N. Y., Feb. 3, 1862.

Saw Dust for Packing Ice.

The following is stated to be the experience of a correspondent of *The Lower Canadian Agriculturist* with ice houses and the packing of ice. He says :—It may be interesting to some readers to hear my experience in packing ice to keep through the summer. Before building, I made inquiries of architects and others, as to how an ice house should be built. Some said, "have it underground ;" others, "have it above ground ;" so I concluded I would try both. I built my ice house six feet under ground, and six feet above, eleven feet long and seven feet wide, with a window and blind at each end, about 18x24 inches, giving good ventilation. I used four-inch studs, filling it to the peak with saw dust. An experienced hand filled the house, which will hold about twenty tuns. He put joists across the bottom, and packed the ice on straw, using it freely at the sides and top.

As soon as warm weather commenced, the ice began to melt, and by the first of July, all that was above ground had been used up, or had disappeared by melting. The underground ice kept better, but all was gone by the middle of August. Some people said it was because it was a new house, and that it would keep better the second year ; I believed it and tried again, but the result was the same—the ice was gone by the middle of August, and the straw rotted.

Some one then suggested that the thickness of sawdust was not sufficient, and that the heat from the bottom caused it to melt. So I put in another set of studs, and filled in again with sawdust, put down a double floor, and inclined that also. I then felt sure it would keep ; although by reducing the size, I could only put in eighteen tuns. That year it kept till the first of September. I was induced to fill it in the same way again, because they said the ice was not solid the year before, and did not keep in any of the houses. The result was the same ; the ice was gone by the first of September.

By that time, I had become convinced that straw was not the right thing to put round it, and that unless I could do better hereafter, I would buy ice during the summer.

I concluded to try once more, and use sawdust. Last winter, I put about six inches of sawdust on the floor, and then packed in the ice, leaving a space of four inches between the ice and the sides, which was filled in with sawdust and the top covered with about six inches also. On the first of September, we had not used it down to the level of the ground even, and could perceive but very little moisture on that which was taken out daily. I am not certain but it might keep well, if packed in an empty stall, with plenty of sawdust round it, or even in a pen out of doors, if well covered with the sawdust, and protected from rain.

How to Save your Eyes.

By sitting in such a position as will allow the light to fall obliquely over the shoulder while reading or sewing.

By not using the eyes for such purposes by an artificial light, especially gas light.

By avoiding the special use of the eyes in the morning before breakfast.

By resting them for halfa minute or so, while reading or sewing, or looking at things at a distance or up to the sky, relief is immediately felt by so doing.

Never pick any collected matter from the eyelashes or corners of the eyes with the finger nails ; rather moisten it and rub it away carefully with the ball of the finger.

Keep the feet warm, and never cool the head suddenly under penalty of inflammation of the eyes.

It is better to bathe the eyes on the outside at night than morning, but it will not do harm to bathe them both morning and evening.

The moment the eye feels tired, the moment you are conscious of an effort to read or sew, lay aside the book or needle and take a walk for an hour, or employ yourself in some active exercise not requiring the close use of the eyes.

The cotton factories in Great Britain, are now consuming at the rate of 30,000 bales of cotton per week. With the quantity on hand at Liverpool, and the amount which is known to be on its way from other countries, they will have a supply to the month of September next.

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HISTORY OF THE HELIOGRAPHIC ART IN EUROPE AND AMERICA.

BY M. A. ROOT.

(Continued from our last number.)

The earliest known attempt at fixing images by the chemical influence of light were those of Davy and Wedgwood, the great improver of English porcelain manufacture. In the "Journal of the Royal Institution," of 1803, appeared a paper by the latter with appended comments by the former, entitled "An Account of a Method of Copying Paintings upon Glass, and of Making Profiles by the Agency of Light upon Nitrate of Silver."

White paper, or white leather saturated with a solution of nitrate of silver (instead of the chloride) was selected as the impressible surface. They made numerous experiments with greater or less degrees of success in getting the images of objects. Neither, however, was able to produce a surface sufficiently sensitive to receive proper impressions from the subdued light of the camera. Davy used to better purpose the solar microscope for obtaining images of small objects. He states, moreover, that he found the chloride more sensitive than the nitrate of silver.

Having no agents to fix the images and to prevent the coloring of the white parts by exposure to light, these gentlemen relinquished their experiments. Iodine was not discovered till 1811, and hyposulphite of soda was discovered by Sir John Herschel only in 1819, and without these indispensables to the art heliography could not advance further than Wedgwood and Davy had carried it.

In 1814 Joseph Nicéphore Niepce, a retired business man, residing at Chalons, on the river Soane, directed his attention to the chemical effects of light, with the object of fixing the images of the camera. Having found that the sunbeam would alter the solubility of various resinous substances, he spread a thin layer of asphaltum on a glass or metal plate and placed this in the camera. Five or six hours after he found on the plate a latent image, which became visible by the application of a solvent to the surface of the plate.

Thirteen years later (in 1827) Niepce experimented with the art at Kew, in England. Some of the pictures made there are still left. They somewhat resemble the daguerreotypes, though far inferior to them.

Louis Jacques Maude Daguerre resided about nine miles from Paris, at the town of Brie upon the Marne; was a painter by profession, a member of the French Academy of Fine Arts and other similar institutions, stood high as a scientific man, and was moreover much esteemed for his goodness and geniality of character. In 1824 he began experimenting to fix the images of the camera by various chemical agencies, employing, like Wedgwood, both the chloride and nitrate of silver spread upon paper. In 1826 he became acquainted with Niepce, and from that time forward the two pursued their researches and experiments jointly. In 1829 a copartnery contracted was executed between them for mutually investigating the subject. Niepce had, in 1826, already solved the problem, that had baffled Wedgwood and Davy, and made his copies of objects insensible to the rays of the sun. He called his discovery "Heliography," or sun sketching—a more accurate title than "Photography," or light sketching, since the pictures are not produced by the light rays but by the active rays of the solar orb.

The reader, I think, will be interested in the following anecdote in relation to Daguerre, related by the distinguished French chemist, Dumas. A lady, says he, came up to him at the close of the lecture, in 1825, and said:—"Monsieur Dumas, as a scientific man, I have a question of vital importance to myself to ask you. I am the wife of Daguerre, the painter. For some time he has let the idea seize him, that he can *fix* the image of the camera. Do *you* think it possible? He is always at the thought; he can't sleep at night for it. I am afraid he is out of his mind. Do *you*, as a man of science, think it can ever be done, or is he mad?" "In the present state of knowledge," said Dumas, "it cannot be done; but I cannot say it will always remain impossible, nor set the man down as mad who seeks to do it." If such was Daguerre's mood fourteen years before he had brought his process to a fitness for publication, we may form some conception of what his discovery must have cost him. At any rate he exhibited the true temper of one of the few whom genius predestines to immortality.

In 1829 Daguerre and Niepce, for the first time, employed iodine for blackening the heliographic plate, which had been discovered in 1811 by M. Courtois, of Paris, in the kelp or ashes of seaweed. Niepce died in 1833, and his son Isidore succeeded him as copartner of Daguerre in heliographic researches and experiments.

In January, 1839, Daguerre announced his great invention, which has since, by common consent, borne his name. In the following July the Chamber of Deputies voted to Daguerre an annual pension of 6,000 francs (subsequently increased to 10,000) and one of 4,000 francs to Isidore Niepce, on condition that they should publish to the world a full description of the process by which their pictures were produced, and also make known all the improvements which might, from time to time, be made therein. Reversions of one half these several sums were, by the same law, secured to the widows of Daguerre and Niepce.

At the time the copartnership was formed between Daguerre and the elder Niepce, it appears that both made their experiments chiefly on plates of copper or silver, coated with different kinds of varnishes and essential oils, without the use of either iodine or mercury. Finally, however, after a long course of observations and experiments, Daguerre exposed an iodized plate in the camera, and then over boiling mercury in an iron crucible. At first there was no favorable result, but on repeating the experiments he found, after the exposure of the plate to the mercury, a dim shadow on the outer edge of it, and the thought occurred that here the heat had been less intense. Whereupon he reduced the temperature and obtained a picture. Daguerre remarks that the image is finer on copper, plated with silver, than on silver. If such be the fact, does it not indicate that electricity plays a considerable part in the operation? Daguerre employed only iodine in coating the plate. Since that date, as we shall see further along, great improvements have been made by using accelerating substances and thus rendering the plate far more sensitive to the action of light. Among these accelerators are bromine, chloride of iodine, and finally a compound of the three, of which I shall speak with some detail hereafter.

On the 31st of January, 1839, Henry Fox Talbot communicated to the Royal Society his photographical discoveries, and on the 21st of February following he published a description of his methods of preparing the paper used in his processes. He did this by dipping the paper into a solution of common salt and then applying to the surface a solution of chloride or nitrate of silver—mostly the latter. After getting the image in the camera, he fixed it by again immersing the paper in a strong solution of common salt. He was able to make paper so sensitive as to obtain the picture of an object, under full sunshine, in half a second. The paper here referred to was that used by him for taking copies of objects by means of the solar telescope. Whether Talbot's attention was first turned to heliographic researches by Niepce's communication to the Royal Society, in 1827, or whether he had commenced his investigations before this, I know not. It is understood, however, that he conducted his experiments independently and without even being acquainted with the Frenchman.

On March 14, 1839, Sir John Herschel made a communication to the Royal Society, recommending the use of hyposulphite of soda as a fixing agent. On Feb. 20, 1840, he sent to the Society a paper on the "Chemical Effects of Light in the Solar Spectrum," wherein he recommends using this solution hot in the case of iodide of silver, as this salt is less readily dissolved by the cold solution of the hyposulphite than is chloride of silver.

In 1840, Rev. J. B. Reade used with good effect, the hyposulphite solution to fix, and the infusion of galls to accelerate the formation of the picture. At the same time the former is known to have been habitually employed by Daguerre, Robert Hunt and others, in addition to Herschel.

In the last paper named Herschel also recommended the employment of iodide of potassium to convert the nitrate of silver on the paper into iodide of silver and gave, moreover, the peculiar properties of the iodized paper.

In July, 1841, Robert Hunt read before the British Association at Plymouth, a paper "On the Influence of the yellow ferrocyanide of potassium upon iodide of silver, and on the high sensitiveness of the same, as a photographic preparation," giving also instructions how to prepare the iodized paper. Iodized paper was used likewise by Ryan, Lassaigne and others, and it seems pretty certain that this paper, as prepared according to the instructions given by Herschel Hunt and others, was an article of commerce, before the patent for the calotype of Talbot had been obtained.

I have already stated, that in 1839, Talbot published to the world his photographic discoveries, together with his methods of producing his pictures. From this period he continued his studies and experiments until 1842, when he published and procured a patent for a process, which was a considerable improvement upon his original one, and was called by him the "Calotype," from two Greek words signifying a beautiful sketch. In this country, however, I believe his pictures are oftenest entitled Talbotypes, on the same principle that Daguerre's are called Daguerreotypes. Talbot subsequently obtained a second patent for his calotype process, in which he had introduced still further (supposed) improvements. To what extent the calotype is now in vogue across the water, I know not. I believe, however, that albumen, collodion and some other pictures have to a great degree taken its place.

(To be continued.)

Air, Sunshine and Health.

A New York merchant noticed, in the progress of years, that each successive bookkeeper gradually lost his health, and finally died of consumption, however vigorous and robust he was on entering his service. At length it occurred to him that the little rear-room where the books were kept opened in a backyard, so surrounded by high walls, that no sunshine came into it from one year's end to another. An upper room, well lighted, was immediately prepared, and his clerks had uniform good health ever after.

A familiar case to general readers is derived from medical works, where an entire English family became ill, and all remedies seemed to fail of their usual results, when, accidentally, a window glass of the family room was broken, in cold weather. It was not repaired, and forthwith there was a marked improvement in the health of the inmates. The physician at once traced the connection, discontinued his medicines, and ordered that the window pane should not be replaced.

A French lady became ill. The most eminent physicians of her time were called in, but failed to restore her. At length Dupeytren, the Napoleon of physic, was consulted. He noticed that she lived in a dim room, into which the sun never shone; the house being situated in one of the narrow streets, or rather lanes of Paris. He at once ordered more airy and cheerful apartments, and all her complaints vanished.

The lungs of a dog become tuberculated (consumptive) in a few weeks, if kept confined in a dark cellar. The most common plant grows spindly, pale and scraggling, if no sunlight falls upon it. The greatest medical names in France, of the last century, regarded sunshine and pure air as equal agents in restoring and maintaining health.

From these facts, which cannot be disputed, the most common mind should conclude that cellars, and rooms on the northern side of buildings, or apartments into which the sun does not immediately shine, should never be occupied as family rooms or chambers or as libraries or studies. Such apartments are only fit for stowage, or purposes which never require persons to remain in them over a few minutes at a time. And every intelligent and humane parent will arrange that the family room and the chambers shall be the most commodious, lightest and brightest apartments in his dwelling.—*Hall's Journal of Health.*

WHITE VARNISH.—Take one ounce of pure Venice turpentine; mix well with two ounces of pure spirits of turpentine; warm in a large bottle. In another bottle put four ounces of best fir balsam (it must be pure), with two ounces of 95 per cent alcohol; shake each bottle well frequently for six hours or more, then mix both preparations in the large bottle. The whole should stand, several days before using, in a warm place.

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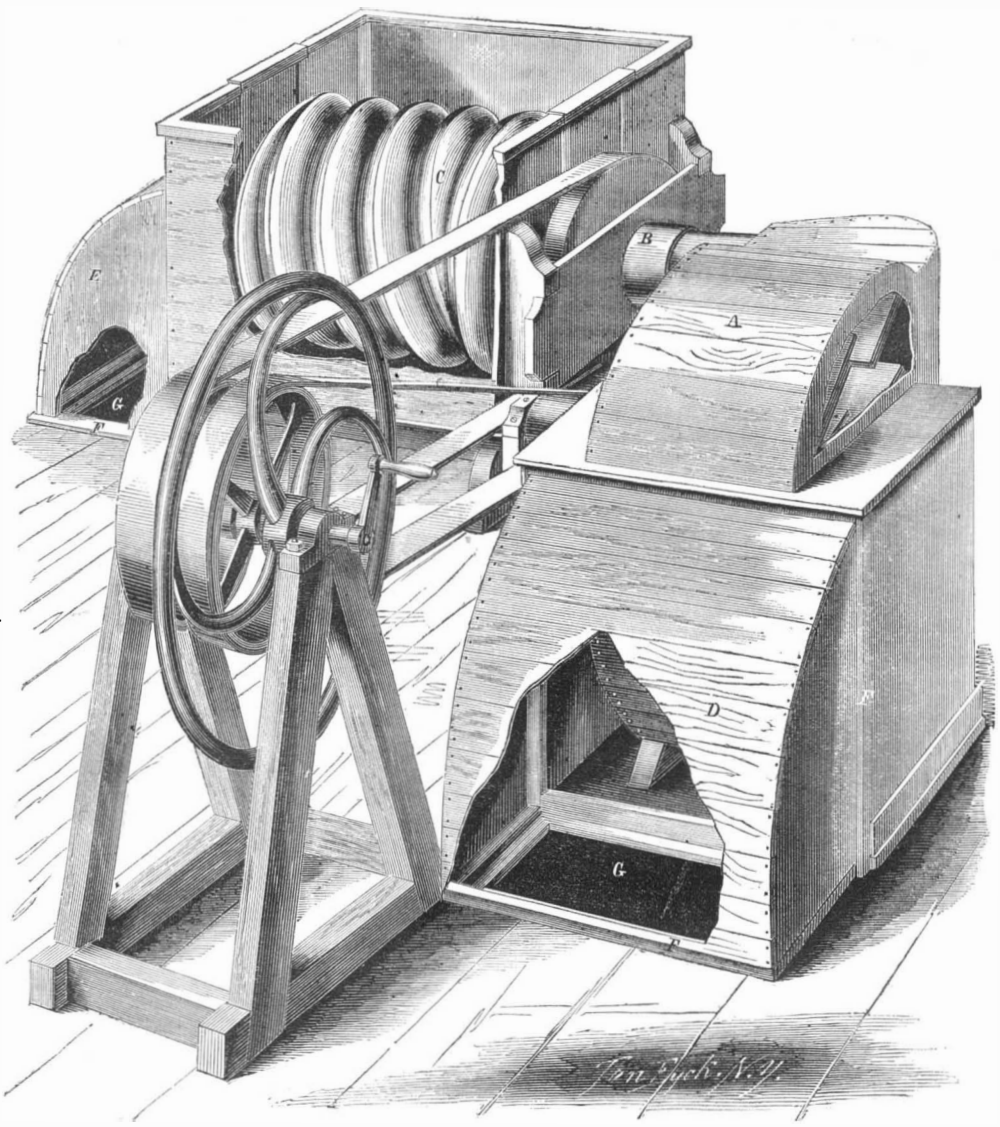
Apparatus for Ventilating Ships, Hospitals, &c.

It is quite a common practice in hot weather for the proprietors of large hotels to arrange series of fans over the tables in their dining rooms, and connecting them together so that one person at a remote part of the room, or standing just outside of it, can operate the whole by a lever or crank. The object of this is two-fold. First, to keep the guests cool, and, secondly, to rid the table of flies. It is also particularly desirable, in hospitals or sick rooms, to keep the air in the room cool and to supply each patient with a certain quantity of fresh air. But by the ordinary fan neither of these objects can be accomplished, as the warm foul air in the room is merely stirred up, when, by an equal amount of labor properly directed, a fresh and cool current might be passed constantly through the room. We have often wondered that some of our enterprising inventors did not devise a simple and efficient apparatus for this purpose, and thus render a valuable service to the community, and at the same time derive a pecuniary benefit themselves. We have at length the satisfaction of illustrating such an appa-ratus, represented in the accompanying engraving.

A fan running in the box, A, drives a current of air through the shaft, B, spiral channel, C, around this shaft, and into the room to be ventilated. The worm, C, runs in an ice box, and is surrounded by pounded ice to cool the air in its passage; the channel being made in spiral form to secure a long passage for the air amid the cooling material. The worm is kept constantly turning in order to stir the cooling mixture and constantly change the points of contact.



PETELER'S VENTILATING APPARATUS FOR SHIPS, HOSPITALS, DINING ROOMS, &C.

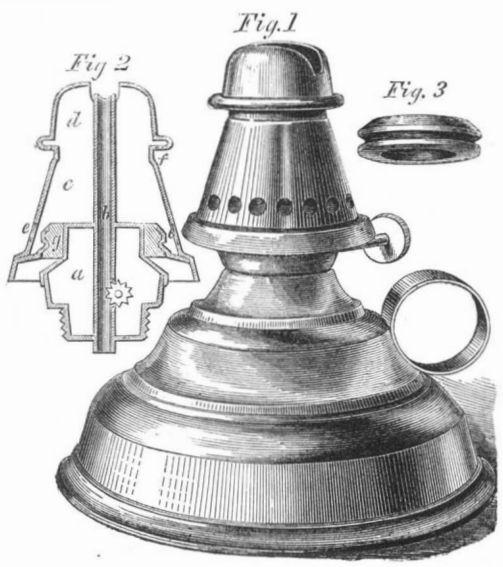
The apparatus is represented in the engraving as designed for ventilating infected ships, especially those infected with yellow fever. It is well known that the virus—whatever it may be—that causes the yellow fever is instantly and completely destroyed by frost or by a reduction of the temperature below the freezing point. Consequently, to eradicate yellow fever from a ship it is only necessary to reduce the temperature of the interior below 32°. It would be impossible to do this by drawing out the air from the hold and supplying its place from the warm atmosphere surrounding the vessel; but the air must be confined and passed repeatedly through the apparatus until it is sufficiently cool. Therefore the boxes, D and E, are placed over hatchways on the deck, and the joints are made air tight by the interposition of the india rubber plates, F F, between the lower edges of the boxes and the deck. The boxes are represented as broken away to show the openings, G G, through the deck. The apparatus being thus arranged, the air is drawn up through one hatchway, passed through the cooling worm, and driven down through the other hatchway; the current being continued till the temperature is sufficiently reduced. The machine may be placed upon a scow or pier and connected with the vessel by means of large tubes. Thus, for the purification of a ship, there is no necessity for any person to even enter the hold or go below the deck to operate the apparatus.

For cooling vessels below the freezing point the box should be filled with ice, or, better still, with a freezing mixture of pounded ice and salt, but for cooling the rooms of hotels a mixture of ice and water is quite sufficient.

The principal ingenuity in this machine is shown in the construction of the spiral channel, C, the difficulty being to form a worm so that it would run easily in the ice box without crowding the ice into one end of the box and packing it so as to obstruct the working of the machine.

The patent for this invention was granted through the Scientific American Patent Agency, April 9, 1861, and further information in relation to it may be obtained by addressing the inventor, Alois Peteler, proprietor of "Peteler's Hotel," at New Brighton, Staten Island, N. Y.

TRITTIN'S COAL OIL LAMP.



Ever since the introduction of coal oil it has been perceived that a lamp which would burn the ne illuminating material without smoke or offensive odor, and without the inconvenience of a chimney must be a great desideratum, and many devices to accomplish the result have been tried, and many patents granted, as the columns of our paper testify. Emil Trittin, of Philadelphia, claims to have attained complete success in this effort, and his lamp is illustrated in the accompanying engraving.

The relative position of the tube and deflector is made adjustable, and the heating of the oil is prevented by the interposition of a slow conductor of heat between the wick tube and the deflector.

Fig. 1 is a perspective view of the finished lamp, and Fig. 2 is a vertical section of the burner. The block, *a*, is screwed firmly into the top of the lamp, and has the wick tube, *b*, passing through it so loosely that it may be slipped up or down, and yet sufficiently tight to retain its position. The tube is surrounded by the usual conical case, *c*, which is surrounded by the dome-shaped deflector, *d*; the case, *c*, being perforated with holes, *e e*, and the base of the deflector being also perforated at *f f*. Between the case, *c*, and the block, *a*, is interposed the block, *g*, of wood or other slow conductor of heat, as fully shown in Fig. 3.

As the lighter and more volatile coal oils require more oxygen for their combustion than the heavier grades, when the former are used the wick tube is lowered to admit a thick current of air to impinge against the sides of the flame; but when the heavier oils are burned the tube is raised so that its upper end may be in closer proximity to the walls of the deflector. The block, *g*, prevents the wick tube from becoming heated, and conducting caloric down into the oil, and thus increasing the evaporation. The inventor says this also diminishes the danger of explosion. "In addition to its cheapness and safety as a portable lamp, its great economy of consumption further recommends it to the attention of housekeepers, hotel proprietors, railroad conductors, for lanterns, and for lighting passenger cars. It will burn without sensible diminution of flame so long as there is any oil in the lamp. Half a pint of oil, with the large size ($\frac{5}{8}$-inch wick) at full head, lasting 14 hours, or about equivalent to a cost of one-quarter of a cent per hour; and the flame being regulated by a ratchet, for night or chamber lamp, the amount consumed may be very inconsiderable, by placing it at its minimum capacity."

The patent for this invention was granted through the Scientific American Patent Agency, Dec. 3, 1861, and further information in relation to it may be obtained by addressing the manufacturer, Francis Lightfoot, at No. 127 Walnut street, Philadelphia. See advertisement on another page.

NEW LOCOMOTIVE.—M. Baldwin & Co. of Philadelphia continue to employ a large number of men in the construction of locomotives. A number now building are for the Philadelphia, Wilmington and Baltimore Railroad, Pennsylvania, and Northern Central Railroad Companies. This firm have completed an eight-wheeled locomotive for the Guantenamo Railroad, in the southern part of Cuba. It is beautifully finished, and has been called the "Jaibo." A passenger locomotive is also under way, for Cuba.

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Scientific American

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY

At No. 37 Park-row (Park Building), New York

O. D. MUNN, S. H. WALES, A. E. BEACH.

TERMS.—Two Dollars per annum—One Dollar in advance, and the emainder in six months.
Single copies of the paper are on sale at the office of publication, and at all periodical stores in the United States and Canada.
Sampson Low, Son & Co., the American Booksellers, No. 47 Ludgate Hill, London, England, are the British Agents to receive subscriptions for the SCIENTIFIC AMERICAN.
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VOL. VI. NO. 8.....[NEW SERIES.].....*Eighteenth Year.*

NEW YORK, SATURDAY, FEBRUARY 22, 1862.

WHAT CAN BE DONE FOR INVENTORS.—ADVICE GRATIS AND ADVICE FOR PAY.

For the information of our new subscribers, we would state that it is the custom, at the office of this paper, to examine models or drawings and descriptions of alleged new inventions, and to give written or verbal advice as to their patentability, without charge. Persons having made what they consider improvements in any branch of machinery, and contemplate securing the same by Letters Patent, are advised to send a sketch or model of it to this office. An examination will be made and an answer returned by early mail. Through our Branch Office, located directly opposite the Patent Office in Washington, we are enabled to make special examinations into the novelty and patentability of inventions. By having the records of the Patent Office to search, and the models and drawings deposited therein to examine, we are enabled to give an inventor most reliable advice as to the probabilities of his obtaining a patent, and also as to the extent of the claim that it is expedient to set up when the papers for an application are prepared. For this special examination at the Patent Office we make a charge of Five Dollars. It is necessary that a model or drawing and a description of the invention should accompany the remittance.

The publishers of this paper have been engaged in procuring patents for the past sixteen years, during which time they have acted as Attorneys for more than FIFTEEN THOUSAND patentees. Nearly all the patents taken by American citizens in FOREIGN countries are procured through the agency of this office.

Pamphlets of instructions as to the best mode of obtaining patents in this and all foreign countries are furnished free on application.

For further particulars as to what can be done for inventors at this office, see advertisement on another page, or address MUNN & Co.,

No. 37 Park-row, New York.

STRONG CANNON—AMERICAN BUILT-UP GUNS.

Among the list of claims for re-issued patents, published on another page of the present number of the SCIENTIFIC AMERICAN, are two for improvements in the construction of cannon by the venerable Daniel Treadwell, late Rumford Professor in Harvard College, Cambridge, Mass. The nature of these improvements consist in forming the body of the gun in which the bore is made of one piece, and shrinking thereon, under great strain, steel, or wrought-iron hoops in one or more layers. For example, the core part of the gun is made of cast iron and the outside turned smoothly and then wrought iron, or steel rings, made somewhat smaller than the parts they are to surround, are heated and shrunk on in the same manner that tires are shrunk on wheels. This is a compound built-up gun, and the principle seems to combine great strength with a small amount of metal. All that is good in the construction of the celebrated Armstrong, and the hooped gun of Capt. Blakely, described on pages 166 and 169, Vol. V. (new series) of the SCIENTIFIC AMERICAN, is the invention of Mr. Treadwell. In 1840 he constructed three 4-pounder built-up wrought-iron guns to test theoretical principles which he had held under consideration for a long time. These guns, when subjected to severe tests, satisfied him that his theory was correct, but in order to carry it out upon an extended scale for larger guns costly machinery was required. Before proceeding to incur further expenditures he visited Washington and had several interviews with Messrs. Upshor and Spencer—Secretaries of War and the Navy—the result of which was a contract for eight 6-pounder field guns and four 32-pounders. In three years after this the foundry and machinery were put up in Boston and the 6-pounder army guns finished. They gave entire satisfaction to Col. Talcott, the Chief of Ordnance. In 1844, the four 32-pounders for the navy were completed, and six others of the same caliber on his own account. All of these not only withstood the contract test, but other tests of a far more severe character. A short account of the manufacture of these guns and the experiments made with them was published in 1845 and circulated in America and Europe—one year after an English patent was obtained through the American consul in London. The guns then made by Mr. Treadwell were the strongest that had ever been produced, but although the War Ordnance Board offered to order a few batteries for the field, the Naval Board gave no further encouragement to the inventor. After expending over seventy thousand dollars on the manufacture of such guns—sixty of which were sunk—the red tapeism which prevailed in Washington led to the abandonment of further operations in their construction. The chief object of Mr. Treadwell was to substitute a light gun of great strength and caliber for the old ponderous cast-iron cannon, and his main reliance was in their adoption for the navy. And now what do we behold within a few years past since the necessity for improved guns has been forced upon all governments? Nothing less than the adoption of Mr. Treadwell's guns in England, Spain and, in some cases, in America. "Other men have entered upon his labors," and Sir William Armstrong could scarcely have been ignorant of his invention. With the exception of the breech-loading and rifling arrangements, the Armstrong guns are in form and construction similar to the American guns built in 1843. The mode of putting the rings together, and the mechanism for executing the work by Armstrong are also similar to the operations and mechanism then adopted and employed.

It is claimed by Mr. Treadwell that the Armstrong, Blakely and Parrott guns are all constructed according to his invention and he believes that such cannon are the strongest in the world according to their weight of metal. One of his 6-pounders, made in 1843, is owned by an inventor in this city, who has fired it times without number, and he has assured us that no stronger gun was ever made. Mr. Treadwell has lately addressed a communication on the subject to the Secretaries of War and Navy, and the Chiefs of the Engineering and Ordnance Departments, directing their attention to the importance of this subject. He contends—and we believe he is right—that his method of constructing guns is most valuable for those of large caliber in order to decrease their weight and enable them to be more easily handled and carried. The government seems to have settled down upon the idea that the very heaviest guns should be made of cast iron. Now, the government which would adopt cast-iron muskets, rifles and pistols would be considered as insane as a railroad company that would adopt cast iron for the boilers of their locomotives. Why? Because cast iron is so weak and unreliable in comparison with wrought iron and steel. Capt. Rodman's method of making cannon with a core having a tube through which a stream of cold water is passed after casting, so as to cool the interior conjointly with the exterior, is admitted to be a great improvement upon the old method of casting solid guns, but Mr. Treadwell contends that the strength of the Rodman guns has been overestimated and overstated in the volume published by government, detailing the experiments with them. He asserts that the method of testing the pressure of the gunpowder upon them by a small piston driving an edged tool into a plate of copper is incorrect, and that it registered twice the amount of pressure actually exerted upon the gun by the powder. This is a subject which deserves a thorough investigation by those who have charge of the Ordnance Department. Several built-up wrought-iron guns have failed, but this was not owing to the character of the metal employed, which is far stronger than cast iron, but the defective modes which had been employed to unite all the parts together. These defects seem to have been completely remedied by this old American method of fabricating guns, and we are unconscious of any good reason that can now be urged against the use of the strongest metal for such purposes, unless it is its greater cost.

STEAM RAMS.

The term steam ram is applied to a war ship, constructed with a strong projecting horn of iron, extending several feet forward under the water at the bow. The object of such a ship is to strike the hull of an enemy's vessel, ram *a la mode*, knock daylight into her timbers, and send her to the bottom. Such bunting war vessels have received the high approbation of Mr. Ellett, C. E., who has given his opinions to the public on the subject through several papers, and it is stated that all the new iron-clad steamers, for both the French and British navies are to be furnished with these striking appendages. The effective power of a steam ram is in proportion to the strength of its hull, its mass and power of engines, and the power of resisting such a vessel is based upon the same conditions. A small steamer in rapid motion striking one that is much larger would damage the latter most provided the former had a hull of sufficient strength to withstand the shock. No large steamer, however, would stand still and allow one of less size to take it at such an advantage. We have seen it stated that the four new iron-clad vessels to be built for the British navy are to have solid iron horns, extending twenty feet under water. Such statements are not credible, because such a mass of metal at the bow of any vessel would tend to run her nose under water, whereas a vessel to sail well must be trimmed to draw less at the bow than at the stern. And there is no necessity for such a long horn on a steam ram, as it would be liable to get broken by coming in contact with a vessel of equal powers, but having a shorter horn. We believe that all iron war steamers should be built with strong iron bows, to employ them when proper opportunities may occur for running down other vessels. For this purpose their hulls must not only be very strong to withstand the shock of contact, but the engines must be framed and built in the strongest possible manner, or they will be most liable to get broken in such encounters.

RENEWED ACTIVITY AMONG INVENTORS.

Business at the Patent Office is gradually resuming its wonted activity. For the past year firearms, projectiles, camp equipage and other articles pertaining to warfare have absorbed the attention of inventors generally, and, as our columns have borne testimony from week to week, some very valuable and ingenious inventions have been produced and patented, and now perform an important part in the suppression of our rebellion.

We have noticed latterly that many of our inventors are again devoting their ingenuity in the line of peaceful inventions, such as improvements in the steam engine and in agricultural and domestic improvements of various kinds, while there is seemingly no diminution in the line of warlike inventions. The result of thus enlarging the bounds of inventors has greatly increased the business of the Patent Office, and, as our weekly list of claims bear evidence, this department of our government is at present flourishing.

A MODEL IN SUGAR.—The model from which our drawing was made of Peteler's ventilating apparatus, illustrated on another page, was constructed of sugar; and represents the color and grain of the wood with the joints and nails in the most perfect manner.

BUCKMAN'S KNIFE SHARPENER.—The address of the inventors of this utensil is E. & A. Buckman, at East Greenbush, N. Y., and not East Greenwich, as we erroneously gave it.

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THE PETROLEUM REGION—THE ROCK OIL BUSINESS—THE EXTENT AND SOURCES OF SUPPLY.

If El Dorado was a myth of the olden time *Oil* Dorado is a shining reality of the present. Under the names of Seneca and Indian oil petrolium had long been known and used in various sections of our country as a medicinal liquid. It was obtained in very small quantities from natural springs, and attracted very little attention until about three years ago, when it began to acquire distinction as an illuminating agent. When oil, obtained from the distillation of coal, had come into very general use, and had superseded fish oil as a burning fluid, its peculiar odor led to the suggestion that the natural oil obtained from some wells in Western Pennsylvania was a similar product, and it was believed that if it could only be obtained in large quantities it would prove to be the cheapest burning fluid for giving light in the world. These anticipations have been realized in a wonderful manner—the boring of a well at Titusville, on Oil Creek, in 1859, solved the question. At quite a moderate depth petroleum was found in great quantities, and this being noised abroad it caused much excitement, and soon led to the boring of other wells in the vicinity, with like results. An "oil fever" affected the community; many sections of the original farms in the region were purchased at high prices by speculators, and the creek bottom was staked out like California claims into patches of a few rods square, for the purpose of boring for oil, and, within the short space of three years, this quiet and sparsely-settled region has become studded with new villages, and supplied with a large population. Although Oil Creek valley seems to be the center of the oil business, petrolium is found throughout a wide extent of country on both banks of the Alleghany, and on many of the creeks which are feeders of this river. Numerous oil wells have been sunk in Tidioute Creek valley and other places, but we intend to describe more particularly the valley of Oil Creek, for although much has been penned and published respecting it, neither printers nor preachers have exhausted its peculiarities.

The petroleum oil trade has become gigantic in its proportions. An idea of it may be obtained from the late annual report of the Philadelphia and Erie Railroad, in which it is stated that in 1859 it carried only 325 barrels; in 1860, 21,794, and last year no less than 134,927 barrels. This railroad carries the oil to Erie, Pennsylvania, from whence it is transmitted to the East by the New York and Erie Railroad. The Atlantic and Great Western Railroad also carries large quantities of the oil, and in summer flat boats come up the creek and take down heavy cargoes to the Alleghany river, thence to Pittsburgh. The product of this pretroleum region is estimated at 75,000 barrels per month. On one day, two weeks ago, there were no less than 120,000 barrels on the surface of the ground on Oil Creek, as we have been assured by one who was on the spot at the time for the very purpose of obtaining accurate information. The yield of these oil wells is so bountiful that the crude petroleum can now be purchased at them for a few cents per barrel. It is so abundant and cheap that the pumping wells are suspended for the present, as it will not pay to incur the expense of using a steam engine for drawing up the oily fluid, hence only the "flowing wells"—those which throw up their petroleum—are in operation. The greatest expense in winter connected with the transit of the petroleum is the hauling of it to the railroad station by teams. The region is very rough and hilly, and the roads bad, hence the expense of teaming is necessarily high for drawing it from twenty to thirty miles to the nearest railroad stations. No less than 3,000 teams are now employed in the Oil Creek region, and yet they are incapable of taking it away as fast as the wells deliver it, therefore vast quantities are suffered to flow into the creek. Never before have men been supplied with such a cheap fluid for producing artificial light, as the refined article in large quantities of several barrels is but 37½ cents per gallon in New York, and only 40 cents per single barrel.

This oil district is peculiar in many respects. The far-famed Oil Creek, ordinarily, is a stream of about 100 feet wide and 3 feet deep. It flows for seventeen miles in a southerly direction from Titusville to Oil City, when it falls into the Alleghany river. It resembles a huge eel, wriggling through a narrow valley, about half a mile wide, with hills rising from 70 to 100 feet high on each side, forming banks. The oil wells are bored in the level meadows or bottoms forming the dry links on each side of the creek, and they extend through the whole valley. The pumping wells have been bored to a moderate depth; the flowing wells are bored from 350 to over 500 feet in depth. Oil City, McClintockville, Rouseville and Titusville are important oil villages, situated in the valley. The flowing wells vary in their productions from fifty up to five hundred barrels per day. As stated in the Titusville *Gazette*, of the 20th ult., the latter quantity is now flowing from a well recently opened, the amount in gallons being no less than 20,000 per diem. There is no evidence of the supply becoming exhausted, as the oldest flowing wells, yield as abundantly to-day as when first opened, and, excepting in a single instance, the flow of none has been affected by new wells, sunk within a short distance. A classical taste seems to pervade the neighborhood. This has been exhibited in the names given to the wells, such as the Buckeye, the Funk, the Eupion well, &c. The boring of these wells is mostly executed with steam power, but the oil is not reached at a uniform depth, although it is generally obtained in the same sandstone strata. It seems to be contained in rocky channels and chambers.

As the drilling of a well proceeds downward the bore is tubed, and when the oil is "struck" a gooseneck pipe is secured to the top joint, and delivers the oil into a tank. A great quantity of gas, under a high pressure, is contained in the subterranean oil chambers, as the oil when first tapped in a flowing well spouts up in a greenish-colored column from two to four inches thick, according to the bore, and to a hight of 100 feet above the surface. The sight is deeply interesting, and it attracts crowds of visitors from all neighboring parts. The liberated gas suddenly expands and saturates the whole atmosphere for a great distance around. Every fire in the vicinity has to be extinguished, and not a cigar allowed to be puffed, under the penalty of an explosion. The petroleum, although coming up from such a depth, is piercing cold, and in this respect it differs from the waters of most artesian wells, which are generally quite warm.

The virtues of petroleum are not confined to giving light. Besides being used for lubricating machinery, and some other purposes, the people in the oil regions value it highly as a panacea for almost all the ills with which human flesh is afflicted. It is applied with gentle rubbing to parts of the body affected with rhumatic pains, and it is said to make them fly as darkness disappears before its light. For coughs and lung diseases it is held to be equally efficacious. An acquaintance of ours, while on a visit recently to the oily regions, was treated to an interesting medicinal scene. A workman at one of the wells having been afflicted with a pain in his chest, lifted half a tumbler full of the crude stingo, said, "Now you see it and (down his throat it went) now you don't see it." It appeared to be a penetrating dose. "There is no accounting for tastes." What signifies the difference between Eupion oil and Epsom salts.

It will readily be appreciated how the *coal-oil* business has been extinguished by the petroleum oil wells, as about fifty gallons of crude oil was obtained from a tun of good cannel coal, costing from two dollars per tun at the mines to twelve and sixteen dollars in New York and other Eastern cities, whereas one well now delivers daily 20,000 gallons, equal to the product of 400 tuns of coal, and all this without the expense for coal or first distillation. The many coal works which were fitted up at great expense in various places, have been converted into petroleum refineries—the only way to save them from extinction. No coal oil manufactories can stand in competition with American petroleum wells, hence an encouraging export trade of the article to Europe has commenced, and if carefully conducted it may result in much benefit to our people. To secure such objects, greater railroad facilities for carrying the oil are required; and we are pleased to learn that branch lines are contemplated to tap the oil valleys, and thus obviate the great expense now entailed in drawing it by horses to the distanct stations. The carrying capacity of the Philadelphia and the Erie Railroad is only 1,000 barrels per day at present.

Comparative Value of Gold and Silver.

Ex-Gov. Pollock, Director of the Mint in Philadelphia, has published a circular giving the regulations of the Mint in relation to the purchase of silver bullion for coinage, the receipt of copper coins of the United States (O. S.) in exchange for cents of the new issue, and the exchange of new cents for the gold and silver coins of the United States:—

The Mint price of silver, heretofore 121 cents, is now raised to 122½ cents per ounce of standard fineness. The silver offered for purchase will be weighed, melted and assayed as usual, and the standard weight determined therefrom in ounces troy to the one-hundredth part of an ounce. The receipt given at the weighing must be presented by the seller or his order. This direction will apply to the Mint at Philadelphia and the Assay Office at New York. The silver purchased for coinage will be paid for in the silver coins of the United States of less denominations than the dollar.

For the information of the public it may be stated that according to the above rate of purchase, the yield of various classes of coin or bullion will be about as follows:—

Five-franc pieces	98.0 cents each.
Mexican and South American dollars	106.3 cents each.
Old Spanish dollars	105.1 cents each.
Revolutionary or "hammered" dollars, (often mistaken for the true Spanish dollar,)	101.2 cents each.
Half-dollar of the United States coined before 1837	52.2 cents each.
The same since 1837 to the last change of standard in 1853	52.5 cents each.
Spanish quarters	23.5 cents each.
Spanish eighths	10.9 cents each.
Spanish sixteenths	5.0 cents each.
Mexican quarters	25.3 cents each.

Quarter dollars are proportionately less productive of premium, while dimes and half dimes, coined before 1837, have lost rather more by wear, on an average, than the premium would make up; those coined since 1835 to 1853 will average a premium of five per cent on their nominal value.

German crowns	112.6 cents each.
Swedish, Danish and Norwegian crowns	111.4 cents each.
Old French crowns	113.9 cents each.
German florins	41.8 cents each.
Prussian and Hanoverian thalers	71.9 cents each.

Fine silver 136 1-6th cents per ounce.

American plate, usual manufacture, 120 to 122 cents per ounce.

Genuine British plate, 125.8 cents per ounce.

The old copper cents of the United States are received at their nominal values, in even sums of five dollars and upward, and cents of new issue given in exchange therefor; but no fractional part of that amount will be taken.

Cents of the new issue will be given in exchange for any of the gold or silver coin of the United States.

The reasonable expenses of transportation of the new cents, in sums of twenty dollars and upward, to any point accessible by railroad and steamboat, will be paid by the Mint.

Sorghum Sugar.

The *Prairie Farmer* says upon this subject:—"Mr. Bender, of the Chicago Refinery, informs us that he has lately completed an analysis of a quantity of the refined sorghum sirup, and finds it to contain 32 per cent of cane or crystallizable sugar, 20 per cent of grape sugar, 22 per cent of gummy, saline and other matters, and 26 per cent of water. The large amount of grape sugar not crystallizable would render the manufacture of this quality of sirup into sugar altogether unprofitable."

Other parties differ widely in opinion from Mr. Bender. In a letter to the Philadelphia *Post*, Mr. F. L. Stewart, of Chambersburg, Pa., asserts that cane sugar can be made profitably from the sorghum. He says:—"Planted in rows four feet apart and at the rate of two stalks to each foot in the row, the yield, when ripe, of crystallizable sugar will vary from 1,200 to 1,800 pounds to the acre, and from 75 to 150 gallons of molasses. It will be apparent to every one who studies the nature of the plant and its climate adaptatations that we are to look for its best development in the great interior valleys of the continent where its sub-tropical relative, the maize, is most at home. Climate points to the great valleys of the Ohio and the Missouri as the future seat of this new department of industry. The soil is rich, pulverulent, silicious marl which covers the broad and beautiful bluff highlands abounding along the latter stream, and the dry, sandy or gravelly terraces along the former. The alluvial bottoms and wet prairies are unsuitable."

CAST-IRON NAILS.—Cast-iron nails are now extensively used, and are found to rust much less rapidly, under the influence of the atmosphere, than ordinary nails, or even those made of copper. They are used in making roofs for manufactories which produce gases that corrode common wrought iron. The nails, after being cast from very hot metal, in sand molds, are made malleable by being exposed to a red heat for 72 hours in retorts, containing pulverized oxide of iron and sand, and then allowed to cool slowly.

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THE NEW TARIFF—DEVELOPMENT OF OUR IRON INTEREST—A FIELD FOR INVENTORS.

The old struggle between Protectionists and free traders—Whigs and Democrats—will probably never be revived. The world has settled down into an active or implied acquiescence in the liberal policy involved in free trade principles; and since their adoption in 1846 we have progressed in general wealth in a ratio sufficiently great to satisfy the ambition of the majority of mankind. What, however, the whigs strived to obtain on principle the war has now necessitated in fact. In order to meet the wants of the government exchequer the tariff of March 2, 1861, imposed a specific duty about equal to that imposed in 1842. The Whig party, then in power, in order to give effect to its principles, established a specific tariff, and imposed upon iron imported in the form of bars or bolts a duty of $17 per tun; upon iron in pigs, a duty of $9 per tun; upon old scrap iron a duty of $10 per tun; and upon steel a duty of fifteen cents per 100 pounds. The act imposing these duties was, however, subsequently amended by the act passed on the 30th of July, 1846; this act imposed, instead of a specific duty, an *ad valorem* duty of 30 per cent upon iron bars, blooms, bolts, hoops, pigs, rods, slabs, &c.

Protectionists and free traders agree that changes in the rates of imports are disastrous, and the steady policy rendered necessary by the large amount of revenue to be raised hereafter by the government will have no small tendency to lighten the burden of these taxes. If the government is maintained and the community can have assurance that our legislation will not be fluctuating we shall certainly very soon produce our own iron and steel.

Whatever natural obstacles it may be necessary to overcome they will all disappear under the repeated efforts of industrious mechanics, aided by the skill and ingenuity of inventors. With the best iron and coal in the world lying in enormous quantities beneath our soil, and strong hearts and laboring hands above it, the question of our ultimate ability to mine and enter it successfully into competition with the foreign metal, is only one of time. This prophecy is fully justified by the history of the iron manufactories in the United States during the last fifteen years. Notwithstanding the blow experienced by them at the reduction of the tariff in 1846, we find that in 1859 there were, within the United States, in working order, 1,159 mills, of which 560 were furnaces, 389 were forges, and 210 were rolling mills; there were 386 mills abandoned, of which 272 were furnaces, 99 were forges, and 15 were rolling mills. The total production of pig iron in the United States in 1854 was 724,833 tuns, in 1855 it was 728,973, and in 1857 it amounted to 812,917 tuns. The crisis of 1856 acted injuriously upon the production of the material; this branch of industry suffering with other branches.

The amount of rails manufactured in the United States for several years previous to 1857, compared with the amount of rails imported, show a gradual increase of the amount made here with a decrease in the amount imported, until the amount made and imported in 1856 about equal each other. The following is a table of years from 1853 to 1856 :—

	Made.	*Imported.*	*Total.*
1853	105,000	298,995	403,995
1854	121,000	282,867	403,867
1855	134,000	127,516	261,516
1856	142,555	155,496	298,051

Thus it is apparent that the domestic manufacture of rail has increased, under and notwithstanding a comparatively adverse tariff. And with no revulsions in trade, we could reasonably expect in a few years to produce all the iron needed for home consumption.

But manufacturers have now a new incentive to enlarge their amount of production. The present tariff, as we have before said, is about equal to that of 1842; and for ten or twenty years it will probably remain the same. The war has necessitated an expenditure which will effectually prevent any reduction of the present tariff, and capitalists, therefore, need have no apprehension of a reënactment of the old tragedy. Notwithstanding the war, our railroads and transportation companies have been doing a heavy business. They were careful at first not to incur unnecessary expenses, but their unexpected good business has worn their rolling stock more than usual, and now necessitates active operation in repairing and reinstating them in their former good condition. In the last five years 9,729 miles of railroad have been laid, and this in spite of the crisis of 1856. We certainly may count on some increase in the future, notwithstanding our difficulties. The value of iron imported in the year 1859 was $21,526,574; and in no better way can the expenses of the present war be paid, than in a channel which will certainly result in developing to a yet unprecedented extent our own productions of native American iron.

This, too, opens a grand field for inventors. Scarcely an invention is patented but what is either connected with iron machinery or has iron as a part of its composition. The extent, therefore, of the development of American iron, and the multiplicity of purposes to which it is applied, increases the opportunities which shrewd inventors are always ready to perceive and turn to account. The article iron has already entered into innumerable services of life, and it is now as much a necessity to civilization as the air we breath is to our existence. We dig it from beneath our feet and it becomes implements that elevate us in the scale of being, which impart to us knowledge and furnishes the means to supply our physical necessities. We prophesy a new era in the development of American iron, unequaled in past time, and by no means conceivable at present.

Superheating Steam.

The engineer of the British Association for the Prevention of boiler explosions, reports as follows regarding superheating :—

In my last report I called attention to the application of steam jackets to cylinders, pointing out their importance as an agent "for effecting economy in the use of steam." I now wish to allude to a kindred and equally important subject, namely, that of superheating, the economy derived from which has now become established by general experience, and in marine engines has, in many cases, effected as high a saving as thirty per cent. I scarcely anticipate such a result as this from its application to Lancashire mill engines; still I am confident that a very considerable saving would be effected, while, at the same time, the vacuum would be improved, the temperature in the hot wells reduced, and less injection water required, which, to steam users having cooling ponds of limited area, would be most important. These results are mainly due to the prevention of condensation and re-evaporation on the internal surface of the cylinder, as explained in my last report relative to the action of the steam jacket; so that the effect of superheating the steam, or coating the cylinder with a steam jacket, is very similar. The application of the jacket, however, to cylinders can only be made at the time of construction, except with considerable difficulty, while the principle of superheating can be applied to old engines as an auxiliary without alteration to the existing arrangements. The subject of superheating has been sadly bugbeared. It has been reported that the use of superheated steam would destroy the surface of the cylinder, piston, and slides, by preventing lubrication; also that it would corrode the metal; that it was highly explosive, productive of great pressure, and altogether dangerous and difficult to deal with. Actual experience, however, has proved that these objections are entirely visionary, and I have only within the last few days been assured by the superintending engineer of all the engines and boilers in the large fleet of the Peninsular and Oriental Steam Navigation Company, where superheated steam is now and has for some time past been extensively employed, that no difficulty is experienced in its use, and no alteration whatever is required in the old engines beyond the introduction of a slightly better description of packing for the glands, while not a trace of corrosion has been found. It only now remains, therefore, for the manufacturing engineers of this district to bring out a simple and efficient superheating apparatus, adapted to mill engine boilers, by which they will not only benefit themselves, but at the same time render essential service to the steam users of the district. I am glad to say that one of our members is now laying down a superheating apparatus, and, as soon as I have an opportunity of doing so, I shall be happy to state to the members of the association the results of its actual working as applied to the boilers of an ordinary mill engine, and to assist in the general introduction of this system amongst all our members by affording any other information I am able. I would state, however, in the mean time, that it is found most advantageous to superheat the steam to about 100 degrees above the temperature of plain steam, when no difficulty is found in lubricating; also that the utmost care must be taken in maintaining the temperature of the steam when once it has been superheated, or the virtue will be lost before it gets to the engine. I found in one case that although the temperature immediately on leaving the superheater was as high as 600 degrees, yet it had fallen nearly to 300 degrees on its arrival at the engine. I understand that some parties entertain the idea that superheating may be advantageously applied where steam is used for heating purposes. I am convinced, however, that such would not be the case, and that disappointment will inevitably ensue wherever superheating is adopted with this view.

Marine Engine Improvement.

It is our belief that one of the most important steps yet to be taken in the path of improvement is that of increasing the working speed of our engines. We are working 7 feet pistons at 300 feet per minute, where we ought to be running 5 feet pistons at 600 feet. The saving in dead weight would of itself be very great, it being understood that the high speed engines were accurately counterweighed, and, moreover, steam can be worked with more economy where there is little time for cooling in the cylinder. To work at a high speed, we should either require to have a long stroke, which, in the case of screw engines, would seldom be admissible, or we should else be compelled to resort to gearing—reversing the usual practice with geared engines, of getting up the speed from a slow-moving piston, by bringing down the speed of an engine making 100 revolutions or so per minute to a propeller shaft working at forty or fifty turns in the same time. If we were to judge by the general practice of marine engineers in "gearing up," we might conclude that spur wheels are not at all objectionable on board a steam vessel, and we should no doubt have them in war vessels were it not that the great spur wheels reach above the water line. In gearing down the speed, however, this would not be the case, as the large wheel need hardly exceed one-third the diameter of the propeller. The pinion or "jack wheel" would be placed to one side, instead of at the top or bottom of the main wheel, and thus, by carrying the crank shaft to one side of the keel of the ship, room would be afforded for a good length of connecting rod, which, in many cases, is now less than twice that of the stroke. Or the pinion could be placed at or near the bottom of the main spur wheel, and thus lower the foundations of the engines, which, in ships with flat or nearly flat floors, is in itself an important matter, and one by which, in many cases, room would be afforded for an additional deck over the engines.—*London Engineer.*

Feeding Domestic Animals.

In Germany, cattle and horses are fed five times each day, and of course a smaller quantity at each meal. Here we feed three times per day. Which plan is right? Do cattle in the wild state feed but three times a day, or do even our domestic cattle educated to three meals per day, adhere to the custom when permitted to range in rich pastures? Or do they eat smaller quantities and more frequently? Are either the habits of the wild cattle or the domesticated, to be taken as pertinent example of the more judicious course to be pursued? Cases may occur where the present custom is most convenient, such as the feeding of working cattle while their drivers are at their meals; but should this apply to fatting cattle, milch cows, or cattle not in use?

A Question in Natural Philosophy.—We very frequently receive letters from correspondents who think that they have discovered a fallacy in the philosophy or an error in the received facts of science. These letters generally show that the writers simply did not understand the subjects that they write about. Indeed we have never received a communication of this character that had any force in it with the single exception of the article that will be found on another page, entitled, "Gravity and the Pendulum." To it we invite the attention of all who are interested in astronomy or natural philosophy.

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RECENT AMERICAN INVENTIONS.

Cork Cutter.—This invention consists in the arrangement of a reciprocating sliding knife in combination with a vibrating gage plate, and with a stationary rest in such a manner that the blocks of cork can be cut into slices or sticks of the desired thicknesss, and that said sticks, after being cut, are caused to drop freely from under the knife by the action of the vibrating gage, thereby enabling the operator to proceed with his work without interruption and without danger of choking the machine; it consists also in the employment of an automatic tilting table in combination with a series of revolving cutters for the purpose of cutting the sticks into pieces of suitable length for the corks to be manufactured. Invented by Edward Conroy, of Boston, Mass.

Budding Knife.—The object of this invention, by Edward D. Gird, of Cedar Lake, New York, and R. Gird, of Healdsburgh, California is to obtain an implement by which trees may be budded or inoculated with far greater facility and with much greater success than hitherto. The invention consists in the employment or use of a blade or cutter provided with curved portions for the purpose of cutting the buds from the limb, and also in the employment or use of a T-shaped cutter for the purpose of making the incision in the stock to receive the bud.

Bridge Girder.—This invention consists in the employment, in combination with a catenary series of links, of a chord, posts, diagonal tension braces and joint blocks, so arranged and applied as to truss the links in the catenary line and make a very simple, light and strong girder. Patented to A. McGuffie, of Rochester, N. Y.

Anemometer.—This invention, the merits of which are due to G. R. Stuntz, of Superior, Wis., consists in a certain system of pencils or other marking instruments connected with a vane, and applied in combination with a sheet of paper or other material moved at a regular speed by a clock movement, for the purpose of indicating and recording the direction and changes of direction of the wind through a considerable period of time. It also consists in certain improved means operating in combination with the vane and movable sheet of paper, or other material, for the purpose of indicating and recording the force or velocity of the wind during a period of time.

Manufacture of Cube Sugar.—One of the obstacles which has heretofore presented itself in the manufacture of cube sugar has been the want of suitable machinery by which to form the sugar into cubes with an economical application of power. The object of this invention is to overcome the above obstacle and to dispense, as far as possible, with manual labor in the manufacture, and to this end it consists in the formation of the cubes from the granular sugar by means of machinery composed of an endless or rotating series of molds fitted with compressing and discharging pistons, and having applied, in combination with them, a cam or cams, or their equivalent, for operating the pistons one or more at a time in regular succession, throughout the whole of the series, whereby, so long as a supply of granular sugar is supplied to the molds, and the machinery is kept in motion, a continuous delivery of compactly compressed cubes is effected. This invention is by Gustavus Finken, of Brooklyn, N. Y.

A Remedy for Sleeplessness.

How to get sleep is to many persons a matter of great importance. Nervous persons, who are troubled with wakefulness and excitability, usually have a tendency of blood on the brain, with cold extremities. The pressure of blood the brain keeps it in a stimulated or wakeful state, and the pulsations in the head are often painful. Let such rise and chafe the body and extremities with a brush or towel, or rub smartly with the hands, to promote circulation, and withdraw the excessive amount of blood from the brain, and they will fall asleep in a few minutes. A cold bath, or a sponge bath and rubbing, or a good run, or a rapid walk in the open air, or going up or down stairs a few times just before retiring, will aid in equalizing circulation and promoting sleep. These rules are simple and easy of application in castle or cabin, mansion or cottage, and may minister to the comfort of thousands who would freely expend money for an anodyne to promote "Nature's sweet restorer, balmy sleep."

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING FEBRUARY 4, 1862.

Reported Officially for the Scientific American.

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 2, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

34,286.—S. F. Ambler, of Brooklyn, N. Y., for Improved Amalgamator:

I claim, first, Giving to the pan, D, the shaking and vibratory motions for the purpose described.

Second, The combination of the agitating board, H, constructed as shown, with the pan, D, for the purpose specified.

Third, Placing the discharge openings, O, upon the side of the pan, D, for the purpose set forth.

34,287.—E. D. Baker, of Claremont, N. H., for Improvement in the Construction of Ordnance:

I claim, first, The flanges projecting from the body of the gun near the breech, in combination with the external screw or straining rods, substantially as and for the purpose described.

I also claim, in combination with the flanges, the wire wrappings, said flanges furnishing both a support for and the means of securing the ends of the wires, substantially as described,

34,288.—F. H. Bartholomew, of New York City, for Improvement in Valve Regulators:

I claim the combination of an open vessel from which water may be removed, with a valve that controls the discharge of the water under pressure into said open vessel, by mechanism, substantially as described, so that the weight of water in the open vessel determines the closing of the valve.

I also claim the combination of the handle by which the valve is opened with the mechanism described, with the open vessel, and with the valve, in such manner that the said handle is made available both to open the valve and to adjust the said mechanism, substantially as described.

34,289.—T. L. Birch and J. C. Noble, of Washington, Pa., for Improvement in Car Couplings:

We claim the combination of the similarly-formed double-hooked bars, C C′ c c′, springs, F, and levers, G′, when the parts are so constructed and arranged as to adapt the hooks to lock together whichever is uppermost, substantially as explained.

[The object of this invention is an automatic coupler adapted to secure the cars when the latter are run together, without necessitating an accurate adjustment of the parts or the setting of them at specific relative hights,]

34,290.—S. A. Clemens, of Rockford, Ill., for Improvement in Construction of Walls of Buildings:

I claim the method of constructing the walls of buildings, and other structured, of lath or any narrow strips of wood put up in two or more parallel tiers or rows with cross ties of the same secured between the lath by mortar or nails to be finished by plastering, when combined either with the vacant space or spaces between the tiers or rows of lath, or with a filling of mortar or other material in the said space or spaces, whether the entire skeleton wall be constructed of the lath work, or it be combined with parts of a frame, substantially as described and for the purposes specified.

34,291.—Edward Conroy, of Boston, Mass., for Improvement in Machines for Cutting Corks:

I claim, first, The arrangement of the vibrating gage plate, H, and stationary rest, G, in combination with the reciprocating knife, b, constructed and operating substantially in the manner and for the purpose shown and described.

Second, The arrangement of the tilting table, C, in combination with one or more rotary cutters, L, constructed and operating substantially as and for the purpose set forth.

34,292.—Samuel and L. A. Davis, of Providence, R. I., for Improved Washing Machine:

We claim the combination of the two suds boxes, A B, the latter latter being fitted within the former, perforated at its sides and bottom and provided with a perforated reciprocating plunger, C, substantially as and for the purpose set forth.

We further claim the two levers, F G, when arranged and connected together as shown, and with the plunger, C, and used in connection with the boxes, A B, as and for the purposes set forth.

[The object of this invention is to obtain a clothes washing machine which will effectually cleanse the clothes from dirt without subjecting them to the usual friction by rubbing, an operation which has a tendency to injure as well as to divest them of buttons.

34,293.—E. P. Dickie, of Fishkill Landing, N. Y., for Improved Chimney for Lamps:

I claim, in glass chimneys for illuminating purposes, the transparent partition or partial partition, d, when made part of and of the same piece as the chimney, substantially as and so as to realize the advantage set forth.

34,294.—John Dickson, of New Castle, Pa., for Improvement in Manufacture of Sheet Iron:

I claim the use of an enamel or preparation for giving a highly glazed and durable surface to sheet iron, composed of an oxide or oxides of lead and carbon, and prussian blue, pulverized and mixed with drying oil, and a solution of beeswax in oil of turpentine, or its equivalent, with or without the addition of a small proportion of acid, and in connection therewith, the reviving of metallic lead in the enamel on the surface of the iron during the annealing process, in the manner and for the purpose described.

34,295.—Watson Duchemin, of Charlottetown, Prince Edward Island, for Improved Anti-friction Bearing of Hoisting Blocks:

I claim the sleeve, g, operating in combination with the box, a, and friction rollers, h, substantially as described.

34,296.—J. H. Ellis, of Brooklyn, Pa., for Improvement in Mills for Crushing Apples, Sugar Cane, &c.:

I claim the fluted rollers, B B, in combination with the rotary cleaners, E E, when said parts are provided respectively with flutes, a, of semi-cylindrical form and with hawk-bill projections, c, and all arranged to operate as and for the purpose set forth.

[This invention consists in the combination of a pair of fluted crushing rollers and rotary cleaners so constructed and arranged that the crushed substance is thoroughly cleaned out of the cavities in the rollers, and the latter thereby enabled always to work in a most efficient manner.]

34,297.—William Fulton, of Elizabeth City, N. J., for Improvement in Cooking Apparatus:

I claim the combination of the lamp, A, with the reservoir or boiler, B, jacket, C, and extinguisher, D, when the whole are arranged, constructed and operated in the manner specified and for the purpose set forth.

34,298.—Benjamin Garvey, of Ashland, N. Y., for Improvement in Ascertaining Position and Direction on Land and Sea:

I claim the application of rotating bodies to the purpose of preserving normal or base lines or planes, whereby the direction and changes of direction of other planes and lines can be ascertained; for the purposes and in the manner set forth substantially in my specification.

34,299.—A. P. Griffing, of East Cambridge, Mass., for Ink stand:

I claim my improved inkstand as made with its cap, screws and holes arranged in the parts, A B, substantially in manner and to operate as specified.

34,300.—C. H. Guard, of Troy, N. Y., for Improved Machine for Making Carriage Wheels:

I claim so proportioning and arranging certain of the parts of said machine that I am enabled, by the auxiliary use of a lathe rest, R, and a chuck, L, to temporarily convert the same into a turning lathe of of suitable proportions for shaping wheel hubs, previous to mortising the same in said machine, all substantially as set forth.

34,301.—C. T. Holloway, of Baltimore, Md., for Improvement in Branding and Stamping Irons:

I claim a branding or stamping iron consisting of a stock, B, false bottom, D, movable types, E, and wedges, F, or screws in lieu thereof; but otherwise constructed and arranged as shown and described.

[This invention consists in an improved device for readily securing and releasing movable dies for branding, stamping or printing.]

34,302.—G. C. Jones, of Alma, Maine, for Improvement in Shells for Ordnance:

I claim, first, A projectile flattened on opposite sides or at its poles, when its equatorial belt or larger diameter only is perforated with holes or bores perpendicular to the axis of the projectile, for the reception of bullets, substantially in the manner and for the purpose described.

Second, The removable plug or block, D, by means of which, in combination with the enlarged chamber or cavity, I am enabled to use my projectile, either as a shot or shell, substantially as set forth.

34,303.—A. S. King, of Commerce, Mich., for Improvement in Gas Retorts:

I claim, first, The employment of a movable cup, B, provided with a hollow cone, b, as its bottom, in combination with a retort, A, provided with a conical protuberance, a, at its bottom and with a movable cap, C, substantially in the manner and for the purpose shown and described.

Second, The arrangement of the annular belt, E, in combination with the the outer retort, A, and with the inner retort, D, as and for the purpose specified.

[This invention consists in the employment of a movable cup provided with a hollow cone at its bottom to fit over a conical protuberance projecting from the bottom of the retort, for the purpose of increasing the heating surface and spreading the material of which the gas is manufactured over a greater surface than can be done on a plain bottom, and also for retaining the residuum from the material used, so that said residuum may be readily removed from the retort by simply removing the cap, this operation being facilitated by having the cap or cover of the retort movable. It consists further in the arrangement of an annular chamber or belt in connection with the inner retort, for the purpose of preventing a draft of the gas in any one direction from the lower part of the retort, thereby allowing sufficient time for the perfect transformation of the material used into gas, and preventing the escape of the material in the form of vapor.]

34,304.—C. W. Krebs, of Baltimore, Md., for Improved Sash Supporter and Fastner:

I claim the obliquely-grooved slide, E, in the described combination with the bolts, C c, springs, D, and a knob or handle, F, the latter being employed to move the slide, E, and likewise the sash itself, in either direction, all as explained.

[This invention is especially applicable to the windows of cars and carriages. The sash is secured at any point at which it may be placed, and by the application of the hand to the proper point to raise or lower it, is automatically released so that it may be freely moved.]

34,305.—L. B. Lathrop, of San Jose, Cal., for Improvement in Apparatus for Shrinking Tires:

I claim a tire-shrinking device composed of a block, A, provided with a concave, E, curved shoulder, b, guides, d d, movable jaws, B B, and wedges, D D, all combined and operating as shown and described for the purpose set forth.

[This invention relates to a simple and efficient device for contracting or shrinking the tires of wheels for vehicles without cutting and welding. The object of the invention is to effect the result without the employment of levers and complex arrangements for compressing the the heated part of the tire, as heretofore practiced.

34,306.—Jones Laubenstein, of Minersville, Pa., for Improvement in Coal Screens:

I claim an improved manufacture of screens for the screening and preparing of anthracite coal, or other coals and hard substances, similarly handled and prepared, substantially as described.

34,307.—Ira Leonard, of Lowell, Mass., for Improvement in Railroad Chairs:

I claim a rail-connecting chair composed of a continuous sheet of wrought iron bent into such a shape that it is enabled to embrace the base and the sides of the abutting ends of two rails while it is rendered lrterally elastic and vertically stiff by means of a hollow rib or fin immediately beneath the embracing jaws of said chair, all substantially as represented.

In connection with my said improved rail-connecting chair, I also claim the use of the wooden cushion, E, or the equivalent thereof, in the manner and for the purpose set forth.

34,308.—J. Y. Leslie, of Brooklyn, N. Y., for Improvement in Tobacco Holders:

I claim the combination and arrangement of the stopple, 1, charger, 2, gate, 3, spring, 4, matchbox, 10, cover, 11, pipe cleaner, 6, the receptacles 7 and 9, with the case, 8, or their equivalents, for the purposes set forth and described.

34,309.—T. J. Mayall, of Roxbury, Mass, for Improvement in Restoring Waste Rubber:

I claim the combining or incorporating of waste vulcanized metallic or hermized rubber with vegetable tar or pine oils, for the purpose and substantially in the manner as set forth.

34,310.—G. B. McClinch, of Hallowell, Maine, for Improved Valve for Hydraulic Engines:

I claim the arrangement, substantially as described, of two opposite port faces of the valve as well as those of its seat.

I also claim the connection piece, f, and its passage, e, in combination with the two valve plates, their seat and chest, when the two opposite port faces of the valve, and those of the seat thereof, are arranged in manner substantially as described.

34,311.—A. McGuffie, of Rochester, N. Y., for Improvement in Truss Girders for Bridges:

I claim the combination with the catenary series of links, A A, of a cord, C, joint blocks, B B, posts, E E, and diagonal braces, f f, the whole arranged substantially as specified.

I also claim the joint blocks, B B, serving the three purposes of connecting the links, A A, supporting the joints of the chord and connecting the diagonal braces, f f, with the chain of links substantially as specified.

34,312.—Charles Monson, of New Haven, Conn., for Improved Writing Desk:

I claim the application of the cover, B, to the drawer holder or box-A, in manner and so as to operate therewith, substantially as specified.

I also claim the improved drawer, as made, with the elevating bottom and mechanism combined with the said bottom and the drawer frame, the whole being arranged substantially in manner and to operate as specified.

34,313.—Charles Monson, of New Haven, Conn., for Improvement in Ladders and Staging for Artisans:

I claim the combination of the two sets of parallel bars or ladders, s, a base or foot connection and a leg stand or pair of stands or the mechanical equivalent therefor, the whole constituting a ladder or artisan's stage, substantially as described.

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34,314.—Charles Monson, of New Haven, Conn., for Improved Folding Stair Case and Ladder:

I claim the described ship ladder or folding staircase or combination of stair plates, or mechanical equivalents, and parallel bars arranged and connected substantially in the manner and so as to operate as described.

I also claim the combination and arrangement of a series of hand holes with the said stair plates, or their equivalents, and their parallel bars, when arranged and connected substantially in the manner and so as to operate as specified.

I also claim the combination of a spring catch and a series of notches or mechanical equivalents therefor, with the stairway constructed of stair plates and parallel bars, arranged in manner and so as to operate substantiallyas set forth.

34,315.—H. W. Mosher, of Coeymans, N. Y., for Improvement in Cooking Stove:

I claim the plate, G, having a grate, H, attached, when used in combination with the front plate of the stove, the fire chamber, C, flues, a a c, and the draught openings, f f h h i, as and for the purpose specified.

[The object of this invention is to obtain a cook stove which will be self-feeding, that is to say replenish its flue chamber with coals for a considerable period of time, and also be capable, by a simple adjustment, of being converted from a self-feeding coal to an ordinary wood-burning stove.]

34,316.—George Owen, of Jasksonville, Ill., for Improved Coupling for Double Plows:

I claim connecting two single plows by means of the hinged coupling pieces or rods, s s, attached to the beams of said plows in the rear of the standards thereof, so as to bring the plows close together, and thereby form a double mold-board plow, in the manner and for the purpose described.

I also claim the combination of the curved or bent pieces, t t, and the sliding joints of the bars, C and D, in the manner and for the purpose specified.

I also claim connecting the compound curved or bent bar, c, with the bar, D, by means of the chain, x, or its equivalent, for the purpose set forth.

I also claim the combination of the front curved stretcher bar, B, and jointed bars, C D, for the purpose of connecting two plows, as set forth.

I also claim the combination of the front straight bar, B, with the curved or bent-jointed bar, C, and straight-jointed bar, D, for the purpose of connecting two plows, as specified.

34,317.—W. H. Palmer and W. Crumb, of Orleans, N. Y., for Improvement in Horse Pitchforks:

We claim in a horse pitchfork, when composed of cross bar, shank and prongs that are rigidly connected and suspended for operation by means of a brace, as described, the bow springing from the suspension brace and connecting it with the shank, as set forth, in combination with a mechanism located within the shank, whereby the bow may be locked or allowed to slide, substantially as described.

34,318.—Addison Smith, of New York City, for Improvement in Rotary Blowers:

I claim the employment or use for the purposes specified of the external case, A, having induction and eduction openings, d e, in combination with the rotary cylinder, B, when the latter is provided with radial sliding pistons, C, placed eccentrically within the case, A, and has its pistons, C, operated or drawn in and out so that their outer edges will be kept in contact with the inner surface of the body, b, of the case, A, through the medium of the segments, F I, and grooves, f g, either or both of the latter being stationary or rotating, substantially as described.

[This invention consists in placing a cylinder having radial sliding pistons eccentrically within a cylindrical case which is provided with an induction and eduction opening, the several parts being so arranged that the moving or running parts may be operated at a very high rate of speed without being subjected to a great amount of wear and tear and the air which enters the device during its operation forced out from it by the action of the pistons in connection with the case, the blast being produced on the same principle as that caused by an ordinary bellows, and not like ordinary rotary fans or blowers produced by a vacuum formed by a rapid revolution of a fan within a case.]

34,319.—C. M. Spencer, of South Manchester, Conn., for Improvements in Breech-Loading Firearms:

I claim, first, in combination with the breech, C, and eccentric, D, applied as described, the hammer, F, secured to the eccentric for the purpose of enabling the breech to be operated by the movements of the hammer, substantially as specified.

Second, In combination with the hammer, F, eccentric, D, and breech, C, I claim the main spring or springs, I I, so applied in relation with a flattened portion, k, of the hammer pin, that the said spring or springs serve not only to produce the blow of the hammer, but to assist in operating the breech, as set forth.

Third, The cylindrical tumbler, G, so applied on an upright axis and in combination with the hammer and trigger as to allow the cock notch, j, to pass beyond the trigger and the hammer to be thrown back for the operation of the breech beyond the position in which it is cocked, substantially as specified.

[This invention consists in a novel arrangement of means for operating the movable breech of a breech-loading firearm, also in a certain mode of combining the breech with the lock.]

34,320.—Robert Spencer, of Brooklyn, N. Y., for Improved Military or other Riding Saddles:

I claim the cantels, C C, and front pieces, D D, when applied to or used in connection with the parts, A A, of the tree connected by the springs, B B, as and for the purpose specified.

[The object of this invention is to obtain a military riding saddle which will conform to the shape of the back of the horse and fit perfectly thereon, and which will form a firm seat for the rider and retain its shape however much it may be used.]

34,321.—G. R. Stuntz, of Superior, Wis., for Improvement in Anemometers:

I claim, first, The combination of the system of pencils, a a, described, the vane, D, and the endless apron, F, or equivalent device, moved by clock-work, for carrying a sheet of paper or other material on which the record of the direction of the wind is to be made, the whole arranged to operate substantially as described.

Second, The employment of one or more prickers, p, actuated by means of one or more springs, i, and one or more pins, h, deriving a rotary motion from a train of gearing driven by a wind wheel attached to the vane, the whole operating substantially as described for the purpose of recording upon the moving sheet of paper or other material the velocity of the wind.

34,322.—J. G. Treadwell, of Albany, N. Y., for Improvement in Cook Stoves:

I claim the employment of the plate, a, in connection with the ovens, B B, arranged as set forth, whereby two separate draughts of air are formed, one upon each side of the ovens, for equalizing the heat, substantially as set forth.

34,323.—J. G. Treadwell and Wm. Hailes, of Albany, N. Y., for Improvement in Parlor Hot-air Stoves:

We claim the employment of the damper, K, constructed and arranged in the manner and for the purpose specified.

Second, The combination of the damper, K, constructed and arranged as specified with the cross pipe, G, and pipe, F, as and for the purpose set forth.

34,324.—H. W. C. Tweddle, of Pittsburgh, Pa., for Improved Apparatus for Distilling Coal Oil and other Substances:

First, I claim the vacuum apparatus, R, with which, by the use of steam, I produce a vacuum.

Second, The use of the vacuum apparatus, R, arranged substantially as described, in combination with the receivers, L and M, or their equivalents.

Third, the use of the vacuum apparatus, R, in combination with the steam pipe, F, arranged in the interior of the still, substantially as described.

34,325.—Geo. W. White, of New York City, for Improvement in Breech-Loading Firearms:

I claim opening and closing the rear end of the barrel by means of a plug which has both a revolving and a sliding motion, substantially in the manner set forth.

34,326.—John Armstrong (assignor to R. T. Kensil & Co.), of Philadelphia Pa., for Apparatus for Drying Pasted Envelopes:

I claim the drum or pulley, A, its endless band, E, and the endless tapers, K, the whole being arranged and operating substantially as set forth, in combination with the fan or its equivalent, for the purpose specified.

34,327.—F. B. Fournier (assignor to himself and Robert Wallace), of Berea, Ohio, for Improved Drain Roller and Molder Combined:

I claim the combination of the rollers, B and C, with the enlargement, b, when arranged in combination with the framework so as to operate in the manner and for the purpose set forth.

I also claim in combination therewith the plow, D, in the manner and for the purpose specified.

34,328.—E. D. Gird, of Cedar Lake, N. Y., and R. Gird, of Healdsburgh, Cal., assignors to themselves and T. J. Bedwell, of Healdsburgh, Cal., for Improved Budding Knife:

We claim, first, The employment or use of the blade, B, provided with one or more curved portions, b, substantially as shown, for the purpose of cutting the buds from the limbs.

Second, A blade provided with a spur, d, at its end, substantially as shown, for the purpose of making the T-shaped incision in the side of the stock to receive the bud.

Third, the combination of the blades, B C, constructed substantially as shown and fitted in a suitable handle, the whole forming a new and useful implement for the purpose specified.

34,329.—Herrmann Grundt, of Berlin, Prussia, assignor to Hess, Kessel & Co., of New York, for Improved Iron Pontoon:

I claim, first, The arrangement and construction of iron pontoons, in sections, when said sections are provided as their ends, with a flanch or angle iron, corresponding with a flanch or angle iron on another and adjoining section, the whole being arranged in the manner and for the purpose, substantially as described

Second, I claim the use or an opening in one or both the end sections, K and L, in a pontoon, constructed as described, closed by a door or doors, in the manner and for the purpose, substantially as specified.

34,330.—E. M. Hendrickson (assignor to himself, J. H. Prentice and J. W. Blackham), of Brooklyn, N. Y., for Improvement in Sewing Machines:

I claim, first, The transversely-reciprocating frame or plate, K, in combination with a clamp or presser foot carried thereon, and adapted to compel the fabric to reciprocate transversely therewith, and to allow it to be fed longitudinally through or upon the same, substantially as and for the purpose set forth.

Second, I claim mounting the longitudinal feeding device, N N′, or its equivalent, on the cross feed reciprocating plate, K, so that each shall perform its proper function, independently of the other, substantially as and for the purpose described.

Third, I claim the clamp or presser foot, U u, so arranged in connection with the curved edge of the plate, K, as to hold the junction of the rim and body of a hat with an adjustable force in the line of the stitches, and to yield to the varying thickness of the stuff, substantially as described.

Fourth, I claim the combination of the hinges, u and v, and springs, u‴ and v′, with the guide or presser foot, U, for the purpose of allowing the said guide or presser foot to be folded back out of the way when changing the hat, and be again readily placed in position, substantially as described.

34,331.—W. H. Place (assignor to himself and George Hayward), of New York City, for Improved Blast Generator:

I claim as an improvement on A. F. W. Party's hydraulic blast generator, patented June 2, 1857, first, The arrangement of rings, A A B B, with the shaft, D, and gearing, F.

Second, The combination of valve, V, or its equivalent, with the valve chamber, G, as and for the purpose described.

34,332.—Christian Richman (assignor to Gustav Wedekind), of Philadelphia, Pa., for Improved Clasp for Lamp Shades:

I claim the clasp composed of the metal ring, D, having lips, f and h, formed by cutting the lower portion of the ring, and any convenient number of springs, m and n, or their equivalents, the whole being constructed and arranged for attachment to the shade and chimney of a lamp, substantially as set forth.

34,333.—S. H. Roper (assignor to Elmer Townsend), of Boston, Mass., for Improvement in Hot-Air Engines:

I claim, first, The employment of a current of air forced in between the prolongation of the piston and the cylinder in a direction counter to that entering from the fire box, for the purpose described.

Second, I claim the air space within the piston, in combination with the double-acting pumps and hollow pistons, for pumping cool air therein and therefrom, for the purpose of preserving the packing cool, as set forth.

Third, I claim regulating the engine, by exhausting the air from the fire box, by means of a governor, as set forth.

Fourth, I claim placing the force pumps upon the top of the cylinder and attaching the piston rods, M, directly to the main piston, for the purpose described.

34,334.—J. F. Sargent (assignor to Elmer Townsend), of Boston, Mass., for Improvement in Machinery for Rolling Metal for Shoe Tacks:

I claim the combination of the guides, F F, and the lips, f f, or mechanical equivalents therefor, with the upsetting flanges and the reducing rollers beveled in opposite directions, substantially as explained.

34,335.—J. F. Sargent (assignor to Elmer Townsend), of Boston, Mass., for Improvement in Machines for Pegging Boots and Shoes:

I claim as a new machine the combination of the mechanism for operating the awl, peg driver, and for feeding the work, with the mechanism for cutting and feeding the peg work, all being arranged compactly in the frame, A, or its equivalent, and operated by the cams and levers, arranged substantially as and for the purposes described.

I also claim the pendulum or swing piece, H, having the awl and peg-driver carrier, L, the throat piece, b, the peg box, W, the pointing mechanism and pegwood feeder, arranged and applied thereto, or connected therewith, as set forth, in combination with so applying such pendulum to a quill or sleeve, F, disposed on the driving shaft, B, or on a stud or arm arranged just above or below the same, that the whole may be caused to operate together in manner and for the purpose set forth.

I also claim combining and arranging with a vibrating peg box and peg-wood feeder, constructed as described, a stationary knife, whereby the pegs are severed from the peg strip, in manner as set forth.

I claim so constructing and applying the throat piece or block to the pendulum, H, as to have no vertical movement, in combination with so forming and applying the retainer that it may have a short vertical movement, whereby the two are made to operate together in manner as set forth.

34,336.—C. E. Sweeney (assignor to himself and W. H. Hooton), of Charleston, Mass., for Improvement in Knapsacks:

I claim suspending the knapsack, A, on the frames, B, or their equivalents, so that an air space may intervene between the knapsack and the back of the wearer, substantially as described and for the purpose set forth.

Second, I claim the shoulder pads, c, in combination with the frame, B, for the purpose specified.

34,337.—Philip Ulmer (assignor to himself, L. H. Worman and J. O. Ely), of Philadelphia, Pa., for Improvement in the Construction of Knife and Fork:

I claim constructing the handles of table knives and forks of sheet metal shafted, so as to be wholly closed and hollow, combined with the knife blade or fork tines, formed of sheet steel, substantially as and for the purpose specified.

34,338.—Philip Ulmer (assignor to himself, L. H. Worman and J. O. Ely), of Philadelphia, Pa., for Improved Camp Spoon:

I claim a spoon formed substantially as specified, so as to case with the knife and fork, as set forth.

34,339.—G. W. Walker (assignor to himself and John Manger), of Lawrence, Mass., for Improvement in Steak Broiler:

I claim my improved steak boiler, having its several parts constructed and arranged in relation to each other and so as to operate in manner as set forth.

34,340.—G. L. Witsil (assignor to himself and L. S. Hacker), of Philadelphia, Pa., for Improved Washing Machines:

I claim the frame, with its vibrating ribbed blocks, D, horizontal bar, E, and lever, F, in combination with the vessel, A, and its permanent ribs, b, the whole being arranged and operating as and for the purpose set forth.

34,341.—B. B. Lewis, of Bristol, Conn., for Improvement in Calender Clocks:

I claim, first, Arranging the month wheel, F, and the year wheel, D, to turn upon the same center, in combination with the indicating pointers, that point to the numerical day of the month, and the month of the year, depicted on the face of the time dial, as a distinct attachment or device for a clock, substantially as and for the purpose described.

Second, I claim the gears, q c, cam, r, plate, s, combined with the wheels, E F, arranged and operating substantially in the manner and for the purpose described.

Third, I claim the hinged and pivoted click lever, I, in combination with the guard, e, gear, B, arranged to communicate motion once in every twenty-four hours, from the center or time spindle, A, or gear, a, to the wheel, F, and at the same time to adjust itself to show on the face of a dial through an indicating pointer, k, the day or number of days in each of the months, substantially as described.

RE-ISSUES.

1,268.—Ethan Allen, of Worcester, Mass., for Improvement in Revolving Firearms. Patented July 3, 1860.

I claim the combination of a revolving cylinder, having its chambers extending entirely through the block, with an unbroken recoil shield having a projection on its face, as described and for the purpose set forth.

I also claim, in the said combination, as described, the making of the said projection on the recoil plate, in the form of an inclined plane, substantially as and for the purpose specified.

1,269.—Gustavus Finken, of Brooklyn, N. Y., for Improvement in Apparatus for Manufacturing Cube Sugar. Patented Aug. 20, 1861.

I claim the formation of the cubes from the granular sugar in the manufacture of cube sugar, by means of machinery composed of an endless or rotating series of molds, fitted with compressing and discharging pistons, and having applied, in combination with them, a cam or cams, or their equivalent, for operating the pistons, one or more at a time, in regular succession throughout the whole of the series, substantially as specified.

1,270.—J. J. Haley, of South Dedham, Mass., for Improved Rollers for Wringing Machines. Patented Jan. 14, 1862.

I claim the connecting or uniting of india-rubber rollers to metallic shafts, by the means and in the manner described.

1,271.—Henry Steinway, Jr., of New York City, for Improvement in Pianoforte Actions. Patented June 15, 1858.

I claim the repeating lever, e, attached to an arm, j, at the back of the jack, and arranged relatively to the hammer, and operating under the control of a spring, substantially as described and for the purpose set forth.

I also claim the employment, in combination with the so-applied repeating lever, of a screw, k, applied to operate substantially as and for the purpose set forth.

[The object of this invention is to provide for the instantaneous returnof the jack to its notch in the hammer but, after the hammer has struck the string, for the purpose of enabling a quick repetition of the blow, by a contrivance operating with less friction than the sliding post and its appendages. It consists chiefly in a repeating lever applied to the jack, and operating under the control of a spring.]

1,272.—Daniel Treadwell, of Cambridge, Mass., for Improvement in the Manufacture of Cannon. Patented Dec. 11, 1855.

I claim, first, In making a cannon consisting of a body, in which the caliber is formed, the walls of which are of one piece, surrounded by rings, hoops or tubes, in one or more layers, placed upon said body under great strain, by which said body is compressed and the natural equilibrium of the molecules or particles of which it is composed disturbed, by their being brought nearer together, and this is accomplished in the manner set forth, viz., by making the hoops smaller than the part which they are to surround, and then expanding them by heat, and then suffering them to shrink or contract, after having been put in their places.

Second, I also claim the method of securing the hoops to the body of the gun, and the several layers of hoops to each other by screw threads, when they shrink to their places, as described.

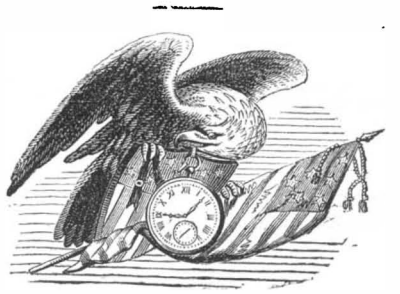
DESIGNS.

1,521.—John Dean and S. P. Emerson, of Worcester, Mass., for Design for a Photograph Preserver.

1,522.—Simeon Hayes, of Prattsburgh, N. Y., for Design for Trellis Frame.

1,523.—C. J. Shepard, of New York City, for Design for a Stove.

PATENTS FOR SEVENTEEN YEARS.



The new Patent Laws enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the government fee required on filing an application for a patent is reduced from $30 down to $15. Other changes in the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for Design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, excepting reference to such countries as discriminate against citizens of the United States—thus allowing English, French, Belgian, Austrian

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Russian, Spanish, and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (exceptin cases of designs) on the above terms.

During the last sixteen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN; and as an evidence of the confidence reposed in our Agency by the Inventors throughout the country, we would state that we have acted as agents for more than FIFTEEN THOUSAND Inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of Inventors and Patentees at home and abroad. Thousands of Inventors for whom we have taken out Patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the Inventors whose Patents were secured through this Office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive Offices, and we are prepared to attend to Patent business of all kinds in the quickest time and on the most liberal terms.

The Examination of Inventions.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submitit to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

Preliminary Examinations at the Patent Office.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a Patent &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. More than 5,000 such examinations have been made through this office during the past three years. Address MUNN & CO., No. 37 Park-row, N. Y.

How to Make an Application for a Patent.

Every applicant for a Patent must furnish a model of his invention. If susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fees by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & Co No. 37 Park-row, New York.

Rejected Applications.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief history of the case, inclosing the official letters, &c.

Caveats.

Persons desiring to file a Caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The government fee for a Caveat, under the new law, is $10. A pamphlet of advice regarding applications for Patents and Caveats, in English and German, furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row, New York.

Foreign Patents.

We are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business, we have offices at Nos. 66 Chancery-lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

Circulars of information concerning the proper course to be pursued in obtaining Patents in foreign countries through our Agency, the requirements of different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our Branch Offices.

Assignments of Patents.

The assignment of Patents, and agreements between Patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park-row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park-row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park-row, New York.

TO OUR READERS.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on Design Patents, when two good drawings are all that is required to accompany the petition, specification and oath, except the government fee.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona fide* acknowledgment of our reception of their funds.

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application at this office. Address MUNN & CO.,
No. 37 Park-row, New York.

Notes and Queries

R. T. C., of D. C.—Your proposition does not seem to meet the case of a patentee, who had inadvertently made a wrong oath at the time he filed his application into the Patent Office. We believe it is perfectly competent to correct such an error by re-issue the practice would be both sensible, and just, and but for the opinion of some crochety judge would have been the established policy of the office.

G. C. Jr., of Conn.—By reference to page 279, Vol. V. SCIENTIFIC AMERICAN, you will find an article upon the use of a patented invention which fully answers your inquiry.

W. R., of Ohio.—The recoil of a gun is produced by the pressure of the gases. The burning of gun powder changes a portion of its elements from the solid to the gaseous state, by which their volume is increased some 300 fold. In expanding, these gases exert a pressure in every direction, driving the ball forward and the gun back with the same force. Capt. Rodman devised a delicate apparatus for measuring the recoil of the gun while the shot was passing along the bore on its way out, and thence by calculations based on the relative weight of the gun and the shot, he was able to ascertain the velocity of the shot during each portion of its passage out.

C. S. F., of N. Y.—Your spring door knob made flush with the face of the door and operated by pushing it in would be an improvement, as the projecting knobs are liable to catch the loose dresses of females and the coat pockets of males. Several steam carriages for family use have been made and used. You will find an illustration of one on page 1, Vol. III. (new series) SCIENTIFIC AMERICAN.

B. A. H., of Iowa.—Calcination produces no chemical change in sand composed of silica. The "shore sand" to which you refer may contain oxide of iron and other substances capable of being decomposed by calcination in an open furnace. You can easily determine the question by an experiment.

H. L., of Mass.—Sweet oil is made from the fruit of the olive, but much oil sold under this name is made from lard. Opium is obtained by wounding the unripe seed capsules of the poppy and collecting the milky juice which exudes from the wound then allowing it to dry in the sun after which it is kneaded into cakes.

J. J. H., of Ky.—Bronzing on metal is produced by powders applied with varnishes. We are not acquainted with any other method of bronzing than by using bronze powders, which can be obtained in nearly all stores where painter's materials are sold.

J. T., of Eng.—We are not acquainted with any original works on fishing by American authors. The good old Isaac Walton is our authority still on this interesting question.

J. B. M., of Ohio.—The question of preserving stone is likely soon to be one of much interest in this city. If you have a reliable article for preserving it, you had better advertise it in the leading city papers. We do not know of any surer way of getting it before the public.

O. A. P., of N. Y.—In No. 5, Vol. XIV. (old series) you will find a diagram and description how to lay out a grain hopper.

H. W. L., of Boston.—We believe that several coats of good linseed oil is the best application you can use for protecting the surface of your artificial stone from absorbing moisture. Any stone, however, which absorbs moisture and freezes in cold weather is unfit for building purposes, because the frost splits it off in scales from the surface.

G. C., of Ohio.—No patent can be obtained in Canada, for an article which has been patented in Great Britain or the United States. The Canadian patent law is very injurious to the interests of the Province, it prevents the introduction of a great number of useful manufactures which would be of great benefit to that country.

J. W. C., of Wis.—Ure's "Dictionary of Arts and Sciences," contains all the published information known to us respecting the manufacture, bleaching and sizing of paper.

J. W. C., of Conn.—A pendulum vibrating on a perfectly frictionless axis and where it would not meet resistance from the air, &c., would oscilate for ever. You cannot, however, obtain a frictionless axis because the friction is just in proportion to the weight of the pendulum.

W. L. W., of N. B.—About the cheapest paint which you can use for a steam boiler, which is intended to stand without use for three months in winter, is a mixture of linseed oil, black lead and some turpentine. A thin coat of coal tar, oil and a little black lead will also answer well. Any paint will burn off when the boiler is again fired up for use. In the use of salt water for steam boilers, no chemicals could be economically employed to prevent saturation of the brine and a deposit of salt.

R. V. J., of Pa.—The adaptation of a well known vegetable substance, as a substitute for coffee is not patentable. A combination of various kinds of vegetables for that purpose might be patented.

P. D. F., of Pa.—Many ways have been proposed for fitting the breech of a breech-loading cannon to make it gas tight. The commonest forms of the breech, have been the slide, the screw and the faucet. In the celebrated Armstrong gun a combination of slide and screw is used, that is said to be perfectly gas tight.

W. F. J., of Del.—If the moon were resting upon the earth would not the two globes be pressed together at the point of contact with great force? The same is the case with the two halves of the earth, and there can be no hollow in the middle. The centrifugal force near the centre of the earth is exceedingly feeble, and at the surface it is just sufficient to raise water 13 miles.

S. L., of Iowa.—Rodman's cannons are all cooled in the manner you propose, namely, by a stream of cold water passed through their interior. You will find a description of the method of cooling, and experiments testing the strength of such guns on page 261, Vol. XI. (old series) SCIENTIFIC AMERICAN. You will also find an illustration of a wrought iron cannon formed in rings bolted together (such as you suggest) on page 220. Vol. II. (old series) SCIENTIFIC AMERICAN. DeBrame's cannon is loaded with a revolving chambered breech. See page 385, Vol. IV. (present series) SCIENTIFIC AMERICAN. We do not discover any patentable novelty in your marking tool.

O. F. D. & Co.—Giffard's injector is manufactured in Philadelphia by Messrs. Sellers.

P. S., of C. W.—The Sibley army tent is manufactured by J. H. Landell, Newark, N. J. Holtzapffel's work on turning and mechanical manipulation can be procured in this city, price $15. We are glad to know that you have taken our paper so long. We hope you may be able to extend its circulation amongst your friends.

A. P., of N. Y.—You will obtain all the information you desire respecting the grinding, &c., of lenses in Dick's "Practical Astronomer." With it and Brewster's Optics, you may be able to make such lenses as you require. A receipt cannot instruct you how to set jewels in chronometers. You must go and learn the art with a practical man. A hard solder for gold is composed of 13 grains of gold, 7 of pure copper and 4 of pure silver. Melt altogether and roll it out thin for use.

T. W., of Ohio.—To make a good black varnish for iron work, take 8 lbs. of asphaltum and fuse it in an iron kettle, then add 2 gallons of boiled linseed oil, 1 lb. of litharge, one-half pound of sulphate of zinc, (add these slowly or it will fume over,) and boil them for about three hours. Now add 1½ lbs. of dark gum amber, and boil for two hours longer, or until the mass becomes quite thick when cool. After this it should be thinned with turpentine to the proper consistency.

E. P. P., of N. J.—"The Engineers and Mechanic's Dictionary," was published some years ago by Messrs. D. Appleton & Co. booksellers of this city.

J., of Wis.—Pure clay is a silicate of alumina, composed of silica and alumina. If a substance not soluble in water, is dissolved in a mixture of acid and water, and then an alkali is added which will combine with the acid, the substance dissolved will return to its solid condition and fall to the bottom of the water. This process is called precipitating, and when ammonia is the alkali used the precipitating is said to be done by ammonia. Any process which causes a substance in solution to take the solid form is called precipitating.

H. W. B., of N. Y.—Your questions in relation to tugs do not state all the conditions necessary for an answer.

A. P. W., of Pa.—We cannot answer your inquiries about Pott's projectile. You had better correspond with him on the subject.

T. McM., of N. Y.—Wells's geology is a good elementary work. You can get it of Balliere Brothers, 440 Broadway, N. Y. An advertisement in the SCIENTIFIC AMERICAN, would doubtless procure for you the kind of miner that you want.

Money Received

At the Scientific American Office on account of Patent Office business, during one week preceding Wednesday, Feb. 12, 1862:—

L. B., of Conn., $20; H. H. W., of N. Y., $45; R. and P., of Pa., $20; W. J. P., of N. Y., $45; H. and B., of France, $20; E. B. McC., of Conn., $20; S. and B., of Wis., $45; D. S., of N. Y., $70; G. H., of N. Y., $30; W. H. C., of Mich., $25; A. O. C., of N. J., $15; J. L., of Mass., $12; P. H., of N. Y., $15; J. G., of Pa., $500; W. B. B., of Ill., $15; S. H. M., of O., $25; H. J., of Conn., $22; L. G., of N. Y., $10: W. H. D., of N. Y., $15; D. and K., of Mass., $25; J. D. W., of N. Y., $15; A. D., of N. Y., $25; J. F. L., of N. Y., $25; G. B. O., of N. Y., $25; J. N. H., of N. Y., $45; R. and P., of Pa., $20; J. L. T., of N. Y., $20; B. and C., of Mich., $20; W. H. Van G., of N. J., $45; J. C., of Conn., $20; C. G., of Mass., $20; E. D. W., of Pa., $40; E. S., of N. Y., $15; E. C., of Mass., $25; J. F. L., of N. Y., $40; J. K. Z., of Ind., $15; J. D., of Ill., $10; D. C. D., of Ind., $15; L. W. P., of Mass., $15; T. C., of R. I., $45; E. C., of Ky., $25; C. P. B., of Conn., $25; McK., and F., of N. Y., $25; S. H., of Ind., $15; C. H. B., of Mass., $15; A. H., of Mass., $15; L. K., of N. Y., $25; G. T., of N. Y., $25; A. W., of Pa., $45; W. H. H., of N. J., $45; A. B. H., of Conn., $20; H. and S., of N. Y., $40; E. M. J., of Conn., $20; W. M. M., of Ill., $45; D. O. F., of Mass., $20; W. W. G., of Me., $15; D. J. M., of O., $25; D. S., of N. Y., $10; J. N., of Ind., $25; J. K., of N. Y., $40; D. and H., of N. Y., $15; C. C., of Ill., $15; A. N. P., of Ill., $15; G. F. H., of Ill., $25; B. F. C., of N. Y., $15; F. C. F., of Mass., $15; F. and G., of Conn., $100; W. and P., of O., $25; R. J. S., of N. Y., $10; E. M., of Conn., $25; D. M., of N. Y., $50; C. W. I., of N. Y., $25.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from Feb. 5, to Wednesday Feb. 12 1862:—

H. & S., of N. Y.; D. S., of N. Y.; A. D., of N. Y; S. A. M., of N. Y.; D. J. M., of O.; J. N., of Ind.; R. K., of Ill.; D. M., of N. Y.; (2 cases.) C. E. L. H., of Conn.; W. H. C., of Mich.; J. L., of Mass.; J. F. L., of N. Y.; E. D. W., of Pa.; E. C., of Mass.; W. & P., of O.; D. & K., of Mass.; S. H. M., of O; C. W. I., of N. Y.; G. B. O.; of N. Y.; G. F. H., of Ill.; E. C., of Ky.; B. B., of O.; G. T., of N. Y.; C. P. B., of Conn.; J. K., of N. Y.; McK. & F., of N. Y.

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Having always maintained the duty of good citizens in all parts of the land to stand by the Constitution, in its spirit and letter, when that Constitution was assailed and its overthrow attempted, we accordingly at once gave a cordial support to the Government in its patriotic endeavor to assert its lawful authority over the whole land. Believing secession to be rebellion, and when attempted, as in this case, without adequate reasons, to be the highest crime, we hold

1. That the war was forced upon us by the unjustifiable rebellion of the seceding States.

2. That the Government, as the ordinance of God, must put down rebellion and uphold the Constitution in its integrity.

3. That every citizen is bound to support the Government under which he lives, in the struggle to reëstablish its authority over the whole country.

4. That the Constitution of the United States is the supreme law of the Government as well as of the people; that the war should be prosecuted solely to uphold the Constitution and in strict subordination to its provisions: and the war should be arrested, and peace concluded, just so soon as the people now in revolt will lay down their arms and submit to the Constitution and laws of the land.

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The state of the country renders it important for us and esirable for the churches, that a new and earnest effort be made to extend the principles of good government and sound religious truth into all the families of the land. In every neighborhood there must be some who do not now take a religious newspaper, and who might with a little exertion be induced to subscribe.

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THE MORTAR FLEET AND MORTARS.

On page 18 (present Vol.) SCIENTIFIC AMERICAN, we first published a brief account of the flotilla of mortar vessels which is being fitted out at this port under Commodore Porter, for operations against some of the fortified places on the Southern coast. The fleet is now in a forward state of preparations, and it is stated, will soon be ready to sail. It is composed of one steamer—the flag ship—and twenty schooners of light draft. These are what may be called bomb-ketches of from two to three hundred tuns burthen. Each schooner is armed with a 13-inch mortar having a bore of 35 inches in depth, and weighing 17,000 lbs. They were all cast at Pittsburgh and have been submitted to very severe tests. Being very heavy, and their recoil being so great, the mortar frame is braced with extraordinary care as represented by the section of the schooner in the figure. The timbers are over a foot square in thickness and 12 feet in length. The whole interior framing of each schooner is very strong. A mortar is a short wide gun for firing bomb shells. It is usually set at an angle of 45° and throws its missile into the air, and when it reaches the proper distance and elevation, it falls down upon the enemy and explodes. The range is always reached by the quantity of powder put into the charge. For different distances different quantities are used, hence a powder chamber as shown in one of the figures, is cast in each. Each mortar is set upon a revolving platform which can be turned in any direction. The figure showing the plan of the platform and mortar represents their parts and crank handles for revolving the frame. Each large mortar is capable of throwing a shell weighing 197 pounds to a distance of 2½ miles. About 20 pounds of powder is used for such a range. Time fuses are generally employed for bomb-shells. Sometimes shells are filled with an inflammable rocket composition and are called *carcasses*. These are designed for setting fire to besieged places. The range of mortars is obtained by observation and calculation. This requires science and practical skill. For a thirteen-inch mortar one gunner and four cannoneers are necessary. The firing is slow—about ten rounds per hour. About 8,000 rounds have been furnished for the fleet.

It is understood that a code of signals has been adopted, and the method of placing and anchoring the vessels for attack determined upon. The mortars cannot safely be fired directly over the sides of the vessel, and therefore the fleet must be partially headed towards the point of attack. The officers are ordered to anchor in the proper position, and to remove a part of the rigging of the vessels, and trust to their best judgment in firing.

The extraordinary weight and strength of the mortars; the long range and high velocity of the projectiles, and their terribly destructive character, combine to render the expedition one of the most important that has been undertaken during the war.

The fleet will be arranged in three divisions, as follows:—

FLAG SHIP—Side wheel gunboat *Octorara*, Commander D. D. Porter, commanding.

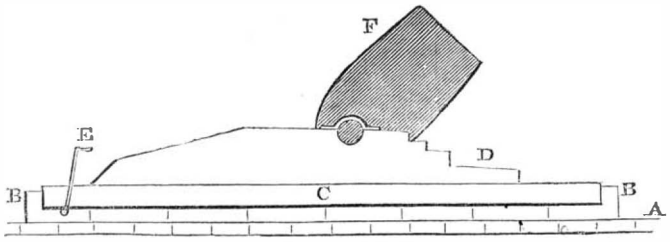
FIRST DIVISION (Lieutenant Watson Smith commanding)—Schooners *Norfolk Packet* (flag vessel), *Oliver Lee*, *Wm. Bacon*, *Arletta*, *C. P. Williams*, *Para*.

SECOND DIVISION (Lieutenant W. W. Queen commanding)—Schooners *T. A. Ward*, (flag vessel), *George Mangun*, *Adolphus Hugel*, *Matthew Vassar*, *Jr.*, *Sidney C. Jones*, *Maria J. Carlton*, *Orvetta*.

THIRD DIVISION (Lieutenant R. Randolph Breese (commanding)—Schooners *J. Griffith* (flag vessel), *Racer*, *Sarah Bruen*, *Sea Foam* (brig rigged) *Henry Jones*, *Dan Smith*.

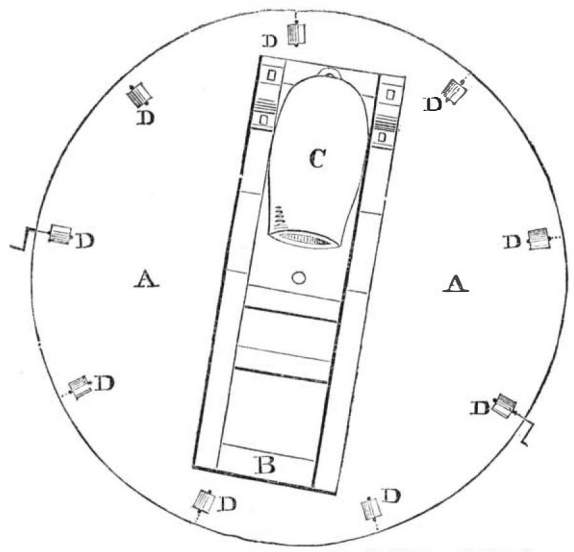
The *Horace Beale* and *A. Houghton* are also of the flotilla. It is understood they will carry only ordnance and ordnance stores and substance.

Mortars are among the oldest species of artillery. They were used to throw balls, red-hot shot and stones long before shells were known. Bomb shells are said to have been invented by the English and were first used in 1588. Ten inch mortars are the most common size. Hand mortars were formerly carried upon poles and fired by a special corps called bombardiers. The largest mortar ever used was one of 24 inches in diameter which was effectively employed by the French army in 1832 at the siege of Antwerp. It discharged shells each weighing 1,015 lbs. which were very destructive and soon brought the city to conditions of surrender. Great expectations have been formed of our mortar flotilla.



A, Deck.—B, Stationary bed.—C, Circle.—D, Mortar slide. —E, Crank.—F, Mortar.

SECTION OF MORTARS.



A A, Mortar bed.—B, Slide.—C, Mortar.—D, Rollers.

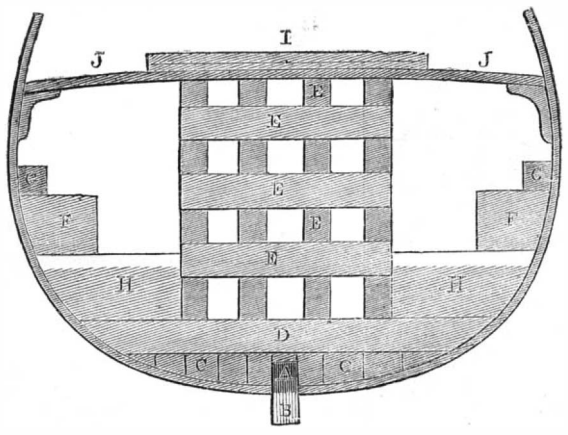
PLAN OF REVOLVING PLATFORM.

High Pressure Steam in England.

We find the following in an editorial in the London *Engineer*:—With respect to heat, steam and the steam engine we cannot doubt that practical opinion is more advanced now than it was even a year ago. If no absolutely new facts have been discovered, others have become more widely and usefully known. The belief in the advantage of high-pressure steam has been constantly increasing, and we have lately had Mr. Fairbairn's declaration of his confidence in the ultimate adoption of a pressure as great as 500 lbs. to the square inch. We may not yet be prepared to work advantageously pressures greater than 100 lbs., or even 50 lbs. at sea, but some of our engineers are already working from 200 lbs. to 150 lbs. in ordinary land boilers, and the Messrs. Perkins were last year working an engine at pressures varying 350 lbs. to 600 lbs. per square inch.

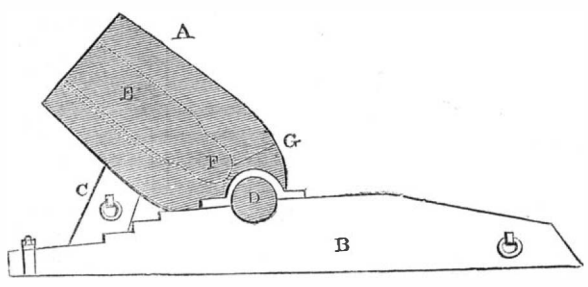
ONE of the best preventives of the ravages of wheat-destroying insects is early sowing.

THE municipal taxes of the city of Philadelphia, in 1861, amounted to $3,080,782.



A, Keelson.—B, Keel.—C, Oak filling.—D, Oak floor timbers.—E, Pine cross-timbers.—F, Lockers.—G, Hummock lockers.—H, Water tanks.—I, Mortar bed.—J, Main deck.

SECTION OF SCHOONERS.



A, 13-inch Mortar.—B, Slide.—C, Quoin.—D, Trunnion.—E, Bore.—F, Chamber.—G, Vent.

SECTION OF MORTARS.

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